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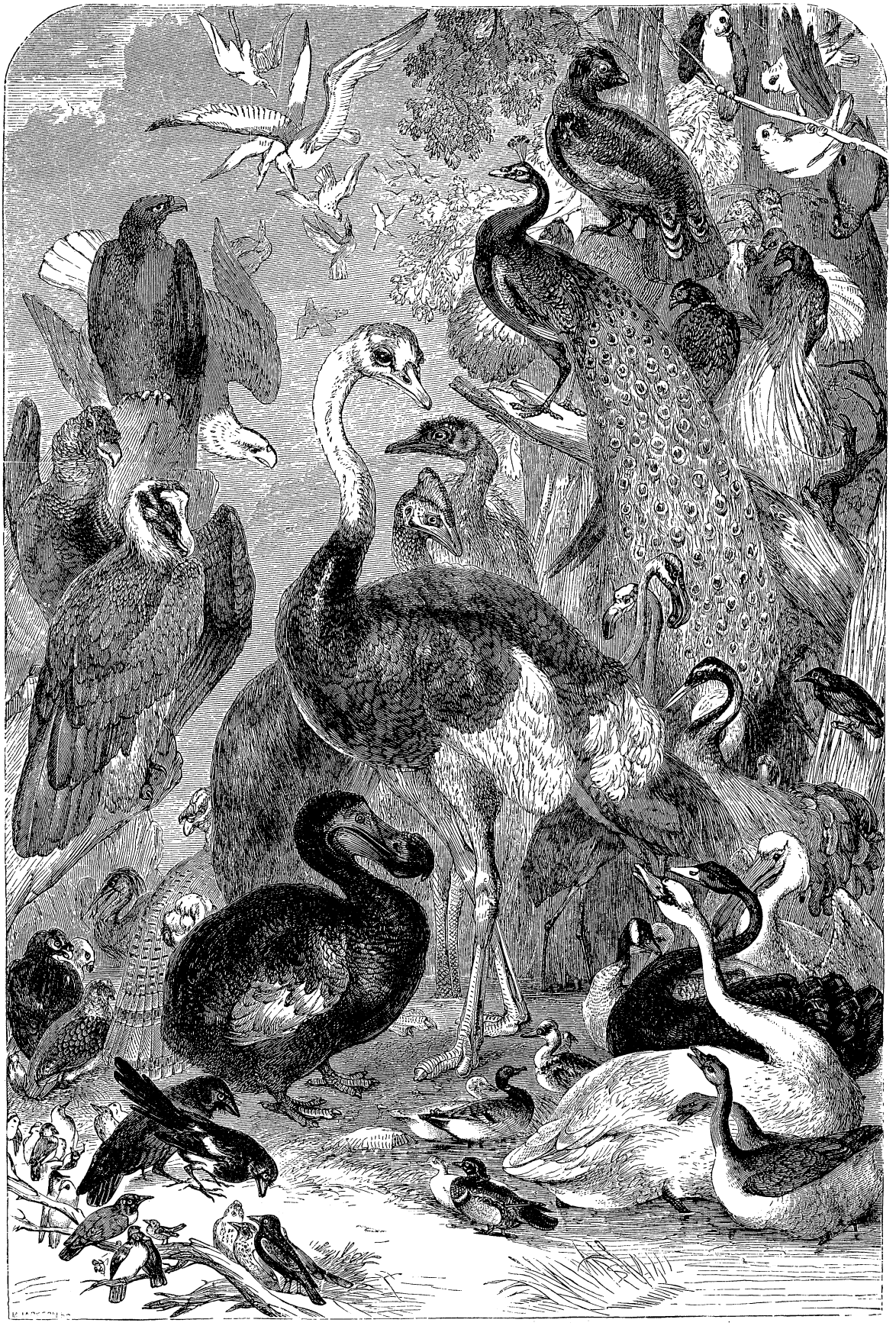
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NATURAL HISTORY

OF THE

ANIMAL KINGDOM,

BEING

A Systematic and Popular Description

OF

THE HABITS, STRUCTURE, AND CLASSIFICATION OF ANIMALS

FROM THE HIGHEST TO THE LOWEST FORMS,

WITH THEIR RELATIONS TO

AGRICULTURE, COMMERCE, MANUFACTURES, AND THE ARTS.

BY

S. G. GOODRICH.

WITH 1400 ENGRAVINGS.

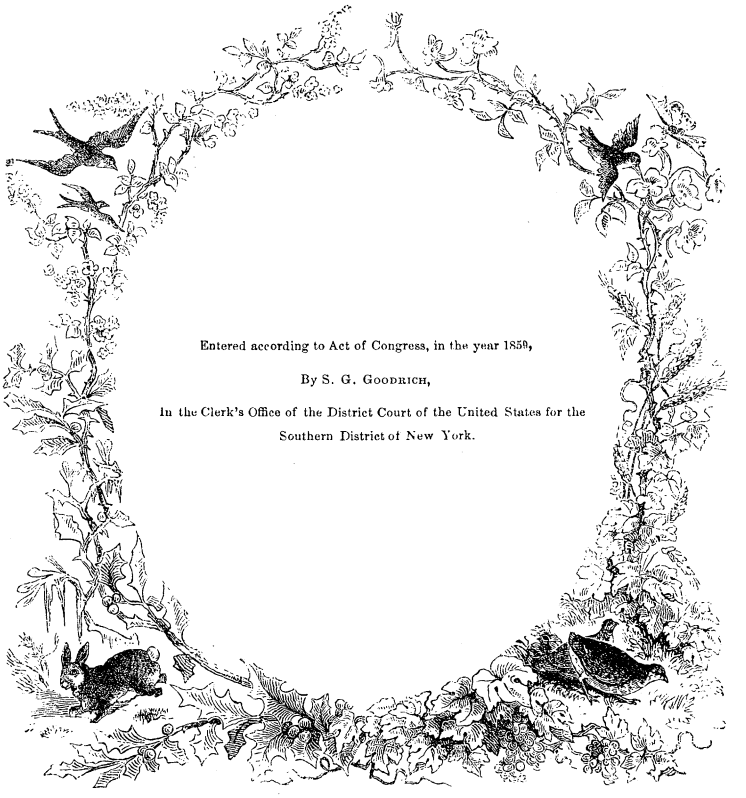
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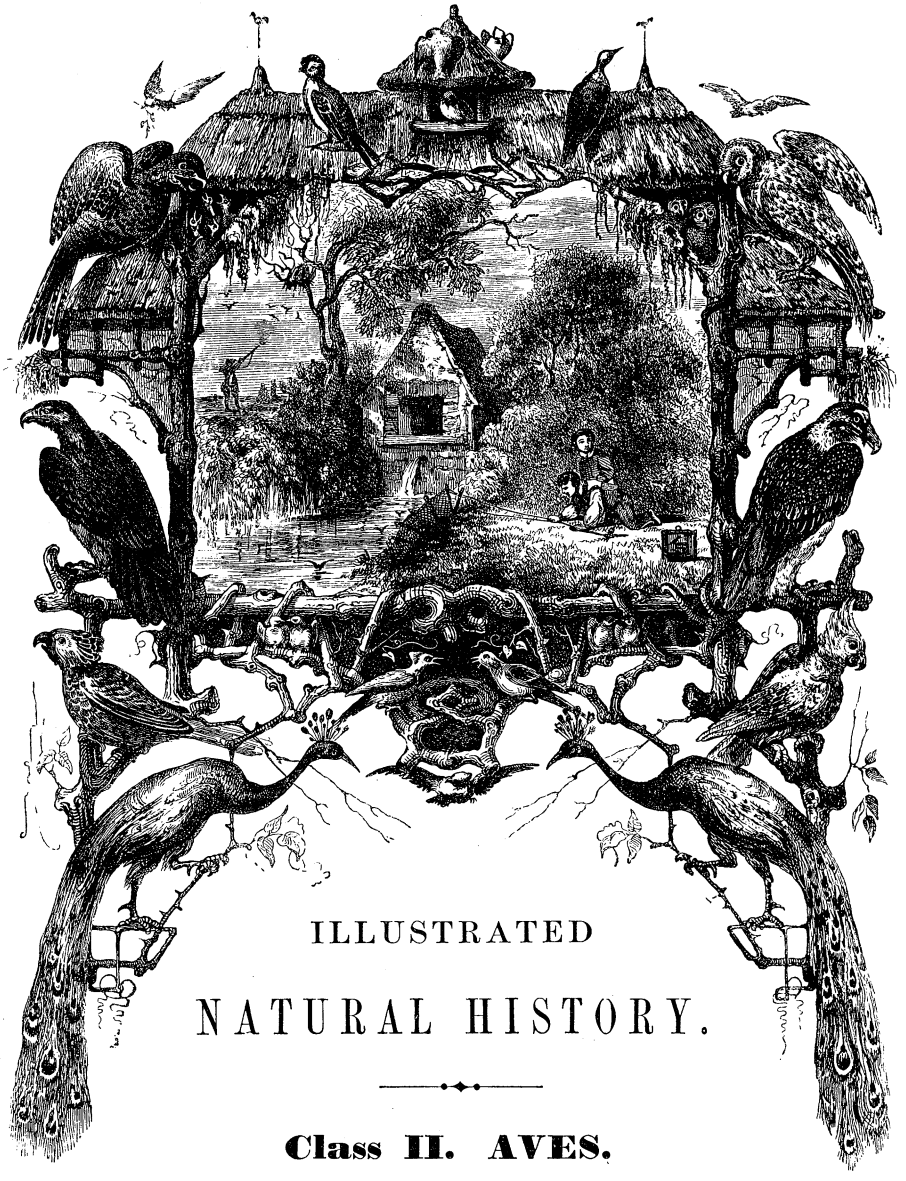
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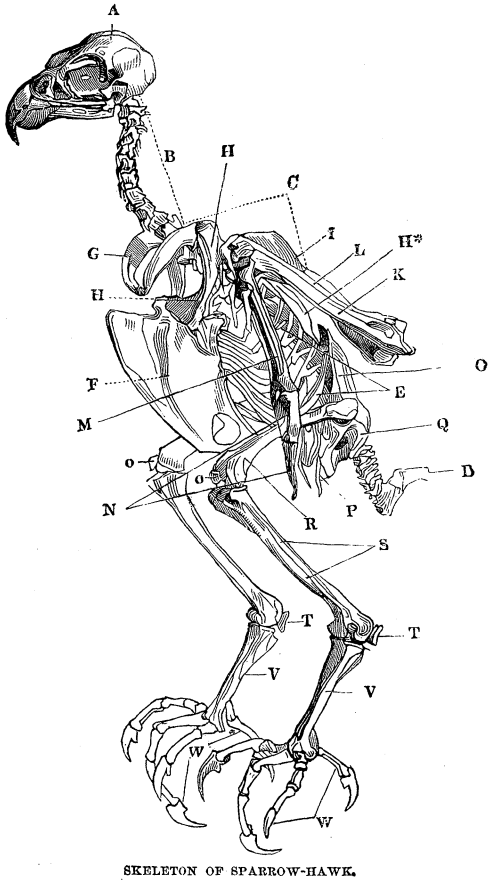
NATURAL HISTORY.

Class II. AVES.

"Of all the animals by which we are surrounded in the ample field of nature," says an eminent writer, "there are none more remarkable in their appearance and habits than the Feathered Inhabitants of the Air. They play around us like fairy spirits, elude approach in an element which defies pursuit, soar out of our sight in the yielding sky, journey over our heads in marshaled ranks, dart like meteors in the sunshine of summer, or, seeking the solitary recesses of the forest or the waters, they glide before us like beings of fancy. They diversify the still landscape with the most lively motion and beautiful association; they come and go with the change of the seasons, and as their actions are directed by an uncontrollable instinct of provident nature, they may be considered as concomitant with the beauty of the surrounding scene. With what grateful sensations do we hail these faithful messengers of spring and summer after the lapse of the dreary

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winter, which compelled them to forsake us for more favored climes! Their songs, now heard from the leafy groves and shadowy forests, inspire delight or recollections of the pleasing past in every breast. How volatile, how playfully capricious, how musical and happy, are these roving sylphs of nature, to whom the earth, the air, and the waters, are almost alike habitable. Their lives are spent in boundless action and nature, with an omniscient benevolence, has assisted and formed them for this wonderful display of perpetual life and vigor in an element almost their own."*



SKELETON OF SPARROW-HAWK.

A, Cranium or Skull. B, Cervical vertebræ.
C, The dotted lines indicate the extent of the anchylosed vertebræ of the back.
D, The caudal vertebræ; the letter is placed on the plowshare or rump-bone.
E, Ribs. F, Sternum, or breast-bone. G, Furcula, or merry-thought.
H H, Clavicular, or coracoid-bone, } Forming the sidesman.
H*, Scapula, or shoulder-blade, }
I, Humerus, or bone of the arm.
K, Ulna, } Bones of the fore-arm: on the ulna is the place of insertion of the
L, Radius, } secondary quills.
M, Metacarpal bones, part of the hand which carries the primary quills.
N, Phalanges of the fingers.
O, Ilium, }
P, Pubis, } Bones of the pelvis.
Q, Ischium, }
R, Femur, or thigh-bone. o o, Patella, or knee-pan.
S, Tibia and fibula, or leg-bones consolidated. T T, Os calcis, or heel-bone.
V V, Metatarsal, or shank-bones. W W, Toes.

A careful examination of the structure of birds will show us that while the vertebrate form is preserved in the skeleton, there is a wonderful adaptation of all the parts to the life these animals are to lead. The prodigious strength necessary to the wings is secured by powerful muscles attached to the *sternum* or breast-bone. As they are to sustain themselves in the air, the requisite lightness is obtained by making the bones hollow and the covering of feathers. In order to facilitate respiration, which would otherwise be obstructed in the rapidity of their flight, the air is not confined to the lungs, as in other animals, but passes through into various membraneous cells exterior to the heart, and in some cases is extended even down the wings.

Birds, as well as quadrupeds, may be generally divided into two great classes, according to their food, some being *Carnivorous*, as eagles, owls, and vultures, and others being *Granivorous*, as quails, grouse, pheasants, and domestic fowls; many, also, hold a middle place, and may be called *Omnivorous*. Taken together, the food of birds is extremely varied, including fish and flesh, amphibia, reptiles, insects, fruits, grains, seeds, roots, and herbs. In the structure of the digestive organs, they exhibit a great uniformity. The œsophagus, which is often very muscular, is usually dilated into a large sac, called the *Crop*, at its entrance into the breast; this is abundantly supplied with glands, and acts as a sort of first stomach, in which the food receives a certain amount of preparation before being submitted to the action of the proper digestive organs. A little below the crop the narrow œsophagus is again slightly dilated, forming what is called the *ventriculus succenturiatus*, the walls of which are thick, and contain a great number of glands, which secrete the gastric juice. Below

* See "Manual of the Ornithology of the United States and Canada," by Thomas Nuttall, Cambridge, Massachusetts. 1834.

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this, the intestinal canal is enlarged into a third stomach, the *gizzard*, in which the process of digestion is carried still further. In the granivorous birds, the walls of this cavity are very thick and muscular, and clothed internally with a strong, horny epithelium, serving for the trituration of the food; but in the predaceous species the gizzard is thin and membraneous. The intestine is rather short, but usually exhibits several convolutions; the large intestine is always furnished with two cœca. It opens by a semicircular orifice into the cloaca, which also receives the orifices of the urinary and generative organs. The liver is of large size, and usually furnished with a gall-bladder. The pancreas is lodged in a sort of loop formed by the small intestine immediately after quitting the gizzard. There are also large salivary glands in the neighborhood of the mouth, which pour their secretion into that cavity.

The organs of circulation and respiration in birds are adapted to their peculiar mode of life: they are not, however, separated from the abdominal cavity by a diaphragm, as in the mammalia. The heart consists of four distinctly separated cavities—two auricles and two ventricles—so that the venous and arterial blood can never mix in that organ, and the whole of the blood returned from the different parts of the body passes through the lungs before being again driven into the systemic arteries. The blood is received from the veins of the body in the right auricle, from which it passes through a valvular opening into the right ventricle, and is thence driven into the lungs. From these organs it returns through the pulmonary veins into the left auricle, and passes thence into the ventricle of the same side, by the contraction of which it is driven into the aorta. This soon divides into two branches, which by their further subdivision give rise to the arteries of the body.

The jaws or mandibles are sheathed in a horny case, usually of a conical form, on the sides of which are the nostrils. In most birds the sides of this sheath or bill are smooth and sharp, but in some they are denticulated along the margins. The two anterior members of the body are extended into wings. The beak is used instead of hands, and such is the flexibility of the vertebral column, that the bird is able to touch with its beak every part of its body. This curious and important result is obtained chiefly by the lengthened vertebræ of the neck, which in the swan consists of twenty-three bones, in the stork of nineteen, the ostrich eighteen, the domestic cock thirteen, the raven twelve. The vertebræ of the back are seven to eleven; the ribs never exceed ten on each side.

The clothing of the skin of birds, consists of *feathers*, which in their nature and development resemble hair, but are of a far more complicated structure. A perfect feather consists of the *shaft* or central stem, which is tubular at the base, where it is inserted into the skin, and the *barbs* or fibers, which form the *webs* on each side of the shaft. The two principal modifications of feathers are *quills* and *plumes*, the former confined to the wings and tail, the latter constituting the general clothing of the body. Besides the common feathers, the skin of many birds, and especially of the aquatic species, in which the accessory plumules rarely exist, is covered with a thick coating of down, which consists of a multitude of small feathers of peculiar construction; each of these down feathers is composed of a very small, soft tube imbedded in the skin, from the interior of which there rises a small tuft of soft filaments, without any central shaft. These filaments are very slender, and bear on each side a series of still more delicate filaments, which may be regarded as analogous to the barbules of the ordinary feathers. This downy coat fulfills the same office as the soft, woolly fur of many quadrupeds, the ordinary feathers being analogous to the long, smooth hair by which the fur of those animals is concealed. The skin also bears a good many hair-like appendages, which are usually scattered sparingly over its surface; they rise from a bulb which is imbedded in the skin, and usually indicate their relation to the ordinary feathers by the presence of a few minute barbs toward the apex.

Once or twice in the course of the year the whole plumage of the bird is renewed, the casting of the old feathers being called *moulting*. In many cases the new clothing is very different from that which it replaces, and in birds inhabiting temperate and cold climates we can frequently distinguish a summer and winter dress. This circumstance has given rise to the formation of a considerable number of false species, as the appearance of the birds in these different states is often very dissimilar, and it is only by an accurate study of the living animals, which is of course almost

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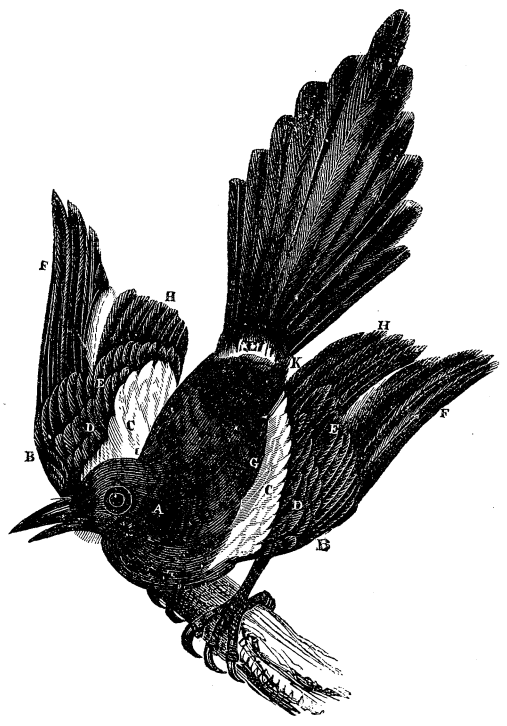
THE IMPERIAL EAGLE: ILLUSTRATION OF THE PLUMAGE OF BIRDS.

impossible with many exotic birds, that such mistakes as these can be prevented or rectified. Another fertile source of similar errors is to be found in the difference which very commonly exists between the two sexes, a difference which is often so great that, without particular information derived from the observation of the birds in their native haunts, it would be impossible to refer the males and females to their proper partners; and the difficulty is still further increased by the fact that the young of all birds in their first plumage differ more or less from their parents,

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and frequently only acquire their mature dress after the lapse of three or four years, the plumage undergoing a certain change at each moult. These circumstances undoubtedly throw great difficulties in the way of the student of ornithology, and it is perhaps not much to be wondered at, if we have sometimes half a dozen different names for different states of the same species; but it must also be confessed, that in this, as in other departments of natural history, the desire to describe new species has often led to an unjustifiable multiplication of errors of this description.

In a zoological point of view the greatest importance attaches to the feathers of the wings and tail, to which different names have been given. The quills are inserted into all the bones of the wing, but the longest are those attached to the bones of the hand, and to these the name of *primaries* is given. The feathers supported by the fore-arm are denominated *secondaries*, and those attached to the humerus *tertiaries*. The thumb also bears a few quills, which form what is called the *alula*, or bastard wing. These, and some other feathers to which particular names have been given, are shown in the annexed engraving. The base of the quills is covered by a series of large feathers called the *wing coverts*, which are also distinguished into *primary* and *secondary*. The feathers of the tail are furnished with numerous muscles, by which they can be spread out and folded up like a fan. Their bases are also covered both above and beneath by smaller feathers, which are called the *tail coverts*.



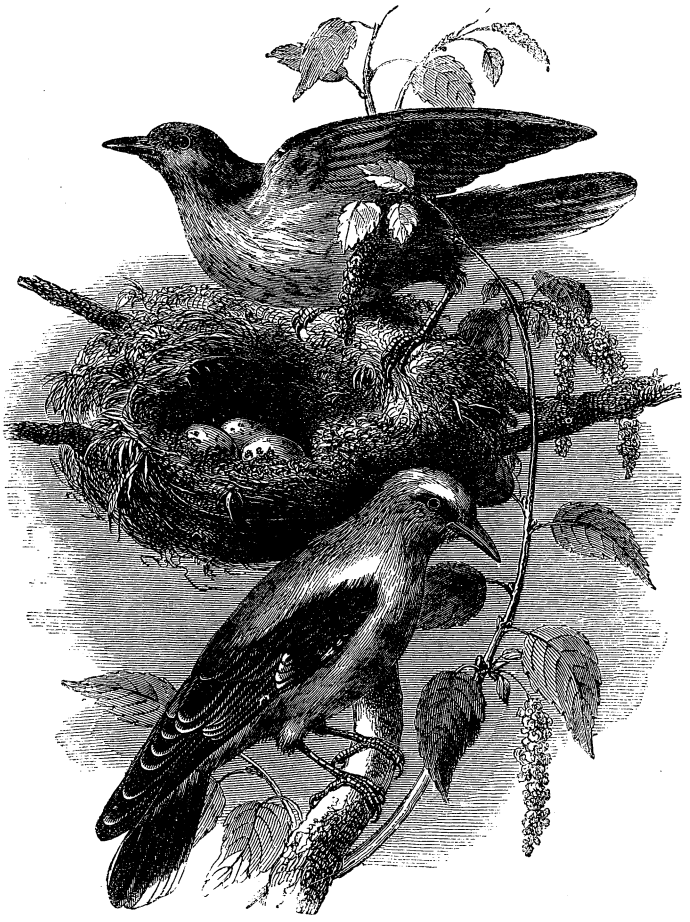
A, ear coverts; B, bastard wing; C D E, wing coverts; F, primaries; G, scapulars; H, secondaries; L, tail coverts; K, under tail coverts, not shown.

It is impossible to conceive any covering more beautifully adapted to the peculiar wants of these creatures than that with which they are endowed by nature. All the feathers being directed backward, the most rapid motion through the air only tends to press them more closely to the body, and the warm air, confined among the inner downy fibers, is thus effectually prevented from escaping. In the aquatic birds the feathers are constantly lubricated by an oily secretion, which completely excludes the water. In the wings the quill-feathers exhibit in the highest degree a union of the two qualities of lightness and strength, while by their arrangement they can be folded together into a very small compass.

In their reproduction birds are strictly oviparous. The eggs are always inclosed in a hard shell, consisting of calcareous matter, and, unlike the animals of some of the succeeding classes, birds, instead of abandoning the hatching of their eggs and the development of their offspring to chance, almost invariably devote their whole attention, during the breeding season, to this important object, sitting constantly upon the eggs to communicate to them the degree of warmth necessary for the evolution of the embryo, and attending to the wants of their newly-hatched young, until the latter are in a condition to shift for themselves.

Most birds live in pairs during the breeding season, which usually occurs only once in the year; in many cases the conjugal union is for life. Both sexes generally take an equal part in the care of the young. They usually form a nest of some description for the reception of the eggs; this is composed of the most diverse materials, such as sticks, moss, wool, vegetable fibers, &c.; in many instances the work of these little architects must excite the admiration of every observer. The nests of different individuals of the same species are generally not only of the same form, but even composed nearly of the same materials, so that a person, accustomed to the inspection of

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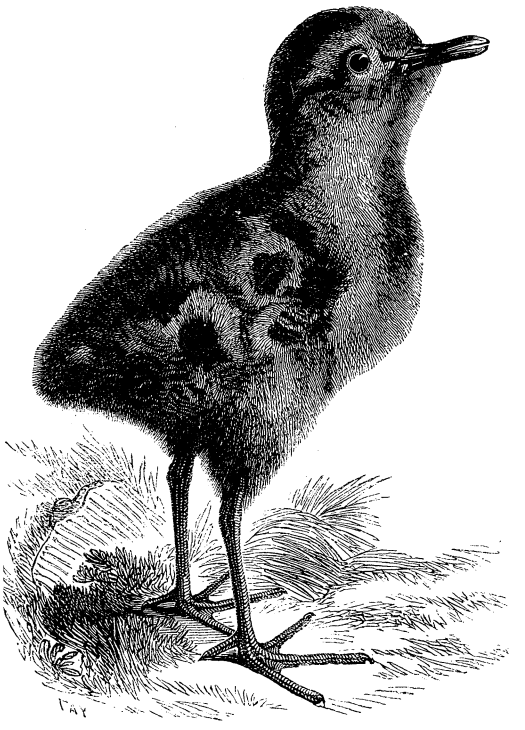


THE GOLDEN ORIOLE: ILLUSTRATION OF PAIRING AND NEST-BUILDING.

birds' nests, can generally tell at a glance the species to which a particular nest belongs. The number of eggs laid is also very uniform in each species.

In the structure and development of the egg, we find a great uniformity throughout this class, the development of the embryo taking place here in precisely the same manner as in the reptiles. But notwithstanding this general uniformity in the processes of reproduction, there is a remarkable difference in the condition of the young birds at the moment of hatching, and this has given rise to the division of the class into two great sections. In some, which usually reside upon the ground, where they form their nests and hatch their young, the latter are able to run about from the moment of their breaking the egg-shell, and the only care of the parents is devoted to protecting their offspring from danger, and leading them into those places where they are likely to meet with food. The others, which in fact constitute the majority of the class, pass more of their time in the air, and generally repose upon the trees, or in other elevated situations, where they also build their nests, and the young birds for some time after they are hatched, remain in the nest in a comparatively helpless state, their parents bringing them food, and attending upon them most assiduously until their feathers are sufficiently grown to enable them to support themselves upon the wing. A chicken or a partridge, a day after it is hatched, will run about and pick up seeds, separating them from the gravel among which they lie, while the young of the tree-birds remain often a month in the nest, receiving without discrimination what is given by their parents. This difference between the young of the two classes will be more apparent by a glance at the engravings pages 7 and 8. The first represents a young curlew, a day or two old, going forth with all his faculties awake, and almost ready to make his way in the world; the other

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THE YOUNG CURLEW.

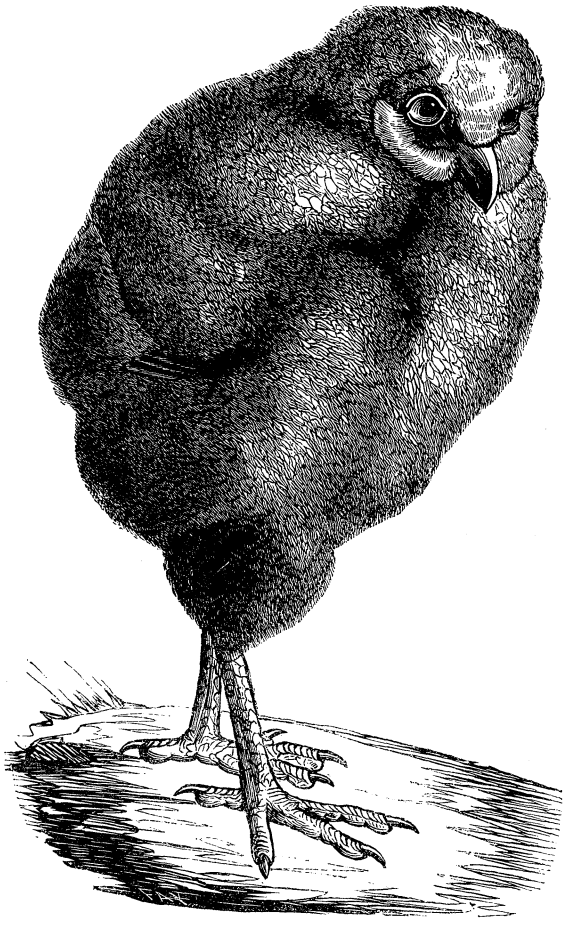
presents a barn-owl, which has reached the comparative old age of a month, and yet—though it may possess something of the serious and knowing aspect of the Bird of Wisdom—seems still sadly puzzled to know which foot he ought to put first.

The longevity of birds is various, and, differing from the case of men and quadrupeds, seems to bear little proportion to the age at which they acquire maturity. A few months, or even a few weeks, are sufficient to bring them to their perfection of stature, instincts, and powers. Land animals generally live five or six times as long as the period of their growth, that is, the time required for reaching their maturity; while birds live ten times as long as the period of their growth. Domestic fowls, pigeons, and canaries live to the age of twenty years; parrots thirty, geese fifty, pelicans eighty; swans, ravens, and eagles exceed a century.

The velocity with which birds are able to travel in their aerial element has no parallel among terrestrial animals. The swiftest horse may run a mile in something less than two minutes, but this speed can only be sustained for a very brief period, while birds in their migrations move at the rate of a mile a minute for several successive hours. Many of them, no doubt, actually travel six to eight hundred miles a day, and are thus able to go from the arctic to the torrid zones in three or four days. A falcon, sent to the Duke of Lerma from Teneriffe to Andalusia, returned in sixteen hours, a distance of seven hundred and eighty miles. The gulls of Barbadoes go to the distance of two hundred miles in search of their food, making a daily flight of four hundred miles.

The migrations of birds are among the most curious and wonderful phenomena connected with their natural history. In some cases these are of comparatively small extent, being prompted only by the necessity of obtaining a supply of food; but many species, known as *Birds of Passage*, perform long journeys twice in the year, visiting temperate or even cold climates during the summer, and quitting them on the approach of winter for more genial climes. The great object of this movement in the economy of nature is to rear their young in the solitude or security of the colder zones, away from the destructive animals—serpents, monkeys, cats, and other predaceous beasts—which infest the tropics. As these birds have neither reason nor experience, they are endowed with instincts which guide them in their wanderings, often extending across seas

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YOUNG BARN-OWL. (See page 6.)

and rivers and continents for thousands of miles. The various modes in which these migrations are performed by different species are exceedingly curious. Some of them, as owls, butcher-birds, kingfishers, thrushes, fly-catchers, night-hawks, whippoorwills, &c., fly only at night, and others, as crows, wrens, pies, creepers, cross-bills, larks, bluebirds, swallows, &c., only in the day. Many move near the earth, while others soar beyond the reach of vision; some go noiseless as the shadows; others proceed with all the noisy parade of a military march. Some—as our blue-bird, robin, blackbird, meadow-lark, cedar-bird, pewee, &c.—do not generally pass beyond the boundaries of our North American continent; they go only so far as may be necessary to find food, and consequently are the first to return with spring; others—as the herons, plovers, swans, cranes, wild geese, &c.—are so impelled by the migratory instinct that they stop neither day nor night till they have reached their far southern homes. While most proceed wholly on their wings, there are some, as the coots and rails, that make a part of their long journey on foot, and others, as the guillemots, divers, and penguins, that make their voyage chiefly by dint of swimming! The young loons, bred in inland lakes and ponds, without the use of their wings, pursue their route by floundering from pond to pond at night until they reach some creek connected with the sea; upon this they fearlessly launch themselves, and finally work their way through storm and calm to the milder zone which they seek. These migrations, it may be observed, are chiefly confined to birds that are bred in temperate climates; but it appears that those which are natives of warm regions have a similar movement, though of less extent.

In considering the senses of birds, we shall observe that *Smell* is generally less acute in them

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than in quadrupeds. The nasal cavity exhibits but few convolutions, and in some birds the external nasal apertures are either entirely wanting or reduced to a very small size. The auditory apparatus is well developed, and the *Hearing* is very perfect, though there is no external ear. The sense of *Taste* is enjoyed in a very inferior degree; the *Sight* surpasses in power any thing with which we are acquainted in other animals. The eyes are large, but have little power of motion; in some birds, as the owls, they are immovable in their sockets. They are furnished with two movable eyelids and a nictating membrane, which performs the process of winking, thus shielding and clearing the eyes without closing the sight. The eye is adapted alike to near and distant vision, so that a bird a thousand feet in the air is able to see, on the earth beneath, the small quadrupeds or reptiles or insects, or even the grain on which it is to feed. By its gift of vision the bird is able to discover at a glance its way amid the mazes of the forest, and to distinguish birds, reptiles, and insects whose colors blend with the objects of nature around and conceal them from the sight of man.

There is nothing, perhaps, more remarkable in this interesting class of animated beings than the voice. The windpipe is wider and stronger in birds than in any other animals, and usually terminates in a large cavity, which augments the sound. The lungs, too, have greater extent, and as we have stated, communicate with internal cavities which are capable of being expanded with air—thus, besides lightening the body, giving additional force to the voice. The scream of the eagle seventeen thousand feet in the air, and thus more than three miles distant, may be distinctly heard, and the calls of flocks of storks and geese, beyond the reach of sight and equally remote, are often audible. And these wonderful powers of voice are infinitely diversified in their expression and use, from the simplest call to the most complicated and elaborate song. Every species of bird has a peculiarity of voice possessed by no other. By this variety of vocal endowment they are enabled to express to one another their wants and passions. This power of communication exists not only between the sexes, but between all individuals of the same species. The least experienced observer of nature knows, too, that the approach of danger is expressed by a universally intelligible cry, which, if uttered by the wren, for instance, is understood by the turkey-cock, and *vice versâ*. Of whatever species the one may be which first perceives the approach of a bird of prey, it is able to excite the attention of all birds in the neighborhood by its peculiar cry of warning. As soon as the blue-tit utters her *Iss!* so indicative of fear and terror—which, nevertheless, she seems sometimes to do from pure love of mischief—the wood is silent in an instant, and every bird either listens for the enemy's coming, or hastens to the aid of the comrade who is attacked. This peculiarity is so marked, that in Europe the fowlers have not failed to turn it to purposes of profit. They build a hut, thatch it with green boughs, and cover the roof with a plentiful supply of limed twigs. They then display a screech-owl or other bird of prey, imitate the sonorous cry of a jay or woodpecker in fear and distress, and birds of every size and species flock to the hut and are caught.

The tones of happiness and joy, by which one bird is able to call forth from another a similar expression of feeling, seem to be almost as universally intelligible. Nor is this joy shown by song alone, although when one little creature begins to sing, the whole wood, or, among domesticated birds, the whole room, soon manifests its sympathy by a general chorus. The same is frequently indicated by single notes. In spring and autumn a great variety of species may often be noticed in hedges and bushes, which seem to take great delight in the utterance of a common cry. Again, when in confinement, birds may often be induced to sing by various noises, loud conversation, and above all, by instrumental music, though on wild birds these means would produce no other effect than to frighten them away.

In many cases, also, different species have a language, which serves for various purposes of mutual communication. For instance, ravens, crows, jackdaws, &c., understand and respond, both by voice and action, to each other's call. By imitating the call of the yellow-hammer, the bird-catchers of Europe succeed in taking the ortolan, the snow-bunting, the reed-bunting, the foolish bunting, &c.; the cry of the chaffinch decoys the mountain-finch, and that of the siskin attracts the citron-finch and the redpole.

"Every bird," says Bechstein, "has received from nature the power of uttering either a song or

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certain distinct sounds, by which it can communicate its desires not only to those of its own, but of other species. These notes, if connected in a melodious succession, are called *a song;* if unconnected, *a call.* In some cases the call is the same, however different the emotions which it is intended to express; in others, it is very various. For instance, the chaffinch's call, when on the wing, is *Eyak! eyak!* its expression of joy is *Fink! fink!*—if angry, the same syllable is repeated more quickly—and *Trief! trief!* is the sign of tenderness or melancholy. The raven's call—*Graab! graab!*—is, on the contrary, the same under all circumstances, and the only indication of a change of emotion is the degree of rapidity with which it is uttered.

"What is called the Song of Birds is, in all cases, expressive either of love or happiness. Thus, the nightingale sings only during the pairing season and the period of incubation, and is silent as soon as compelled to feed its young; while, on the contrary, the starling, the bullfinch, and the canary, sing throughout the year, except when dejected by moulting. It seems, in general, to be a prerogative of the males, by which they either invite or seek to retain the affections of the females. There are indeed a few species, as in the European redbreast and lark, and in the canary, &c., the females of which, especially if kept by themselves, manifest a capability of uttering a few notes like those of the male; but in general they only listen to the song of the males, in order to show their preference for the most accomplished singer. In a cage of canaries, the liveliest female always pairs with the best singer, and a female chaffinch, when wild, will choose out of a hundred males, the mate whose song is most pleasing to her."

Some birds sing throughout the day; some are heard early in the morning; others in the evening, and a few seem to prefer the silence of the night. Some prefer to sing in company; others are mute except when alone. The nightingale, for instance, is silent in the daytime, and sings only in the evening, or at night. It seems, indeed, as if the queen of European song birds was conscious of the superiority of her powers, and disdained to raise her voice amid the various noises of the day and the cry and twitter of other birds, but reserved it for a period when it could be better heard and more fully appreciated by men. It is remarkable, that all birds which, unlike the redbreast, siskin, or bullfinch, do not sing throughout the year, appear to forget their song during the process of moulting, and have to learn it again every spring.

"The melody of birds," says Broderip, "finds its way to the heart of every one; but the cause that prompts the outpourings, that make copse, rock, and river ring again on a fine spring morning, is more a matter of doubt with ornithologists than the uninitiated in zoological mysteries might suppose. Much has been written on this subject, and upon a consideration of the different opinions, aided by our own observations, we are inclined to think that love and rivalry are the two great stimulants, though we do not mean to deny that a bird may sing from mere gayety of heart, arising from finding itself in the haunts dear to it, and in the midst of plenty of the food it likes.

"In England, the season of reproduction is undoubtedly that wherein

> 'The isle is full of pleasant noises,
> Sounds, and sweet airs, that give delight;'

and about ten weeks have been mentioned as the period during which most of our wild birds are in song. That there are exceptions to this rule there is no doubt. We have heard a wild thrush, one of the sweetest singers of his tribe, sing far into September, but we watched narrowly and never could find that he had a mate. Then, again, we have the autumnal, and even the winter notes of the robin, long after the breeding season; and caged birds, if well fed and kept, will sing the greater part of the year."

No naturalist appears to have paid greater attention to this part of our subject than Colonel Montague, and his remarks thereupon are exceedingly interesting. "There is no doubt," he says, "that birds in confinement will learn the song of those they are kept with; but then it is constantly blended with that peculiar to the species. In the spring, the very great exertions of the male birds in their vociferous notes are certainly the calls to love, and the peculiar note of each is an unerring mark for each to discover its own species. If a confined bird had learned the song of another, without retaining any part of its natural notes, and was set at liberty, it is probable it would never find a mate of its own species; and even supposing it did, there is no

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reason for believing the young of that bird would be destitute of its native notes; for if nestling birds have no innate notes peculiar to their species, and their song is only learned from the parent bird, how are we to account for the invariable note each species possesses, when it happens that two different species are bred up in the same bush, or in the contiguous one, or when hatched or fostered by a different species? The males of song birds do not in general search for the female, but, on the contrary, their business in the spring is to perch on some conspicuous spot, breathing out their full and amorous notes, which, by instinct, the female knows, and repairs thither to choose her mate. This is particularly verified with respect to summer birds of passage. The nightingale, and most of its genus, although timid and shy to a degree, mount aloft, and incessantly pour forth their strains, each seemingly vying in its lone, love-labored song, before the female arrives. No sooner does the female make her appearance than dreadful battles ensue—their notes are changed; their song is sometimes hurried through without the usual grace and elegance, and at other times modulated into a soothing melody. The first we conceive to be a provocation to battle at the appearance of another male; the last, an amorous cadence, or courting address. This variety of song only lasts till the female is fixed in her choice, which is in general a few days after her arrival, and if the season is favorable, she soon begins the task allotted to her sex.

"The male no longer exposes himself as before, nor are his songs heard so frequently, or so loud; but while she is searching for a secure place in which to build her nest, he is no less assiduous in attending her with ridiculous gestures, accompanied with peculiarly soft notes. When incubation takes place, the song of the male is again heard, but not so frequently as at first; he never rambles from hearing, and seldom from her sight, and if she leaves the nest, he accompanies her with soft notes of love.

"The continuation of song in caged birds by no means proves it is not occasioned by a stimulus to love; indeed, it is probable that redundancy of animal spirits from plenty of food and artificial heat may produce the same result, whereas wild birds have it abated by a commerce with the other sex; but even in their natural state birds may be forced to continue their song much longer than usual. A male redstart made his appearance near my house early in spring, and soon commenced his love-tuned song. In two days after, a female arrived, which for several days the male was continually chasing, emitting soft, interrupted notes, accompanied by a chattering noise. This sort of courting lasted for several days. Soon after, the female took possession of a hole in a wall close to my house, where she prepared a nest and deposited six eggs. The male kept at a distance from the nest; sometimes sang, but not so loud nor so frequently as at first, and never when he approached the nest. When the eggs had been sat on a few days I caught the female. The male did not miss his mate immediately, but on the next day he resumed his vociferous calls, and his song became incessant for a week, when I discovered a second female;—his note immediately changed, and all his actions as before described, returned. This experiment has been repeated on the nightingale with the same result; and a golden-crested wren, who never found another mate, continued his song from the month of May till the latter end of August. On the contrary, another of the same species, who took possession of a fir-tree in my garden, ceased its notes as soon as the young were hatched."

In some comments upon the above, Rennie expresses an opinion that birds sing most frequently from joy and buoyancy of spirits, and not unfrequently in triumphant defiance of rivalry or attack. He says: "I have a redbreast who will sing out whenever I snap my fingers at him, and the sedge-bird sings when a stone is thrown into the bush where he may be."

According to Syme, the song of birds may be divided into six distinct utterances: *first*, there is the call-note of the mate in spring; *second*, the loud, clear, and fierce notes of defiance; *third*, the soft, tender, full, melodious love-warble; *fourth*, the notes of fear when danger approaches the nest; *fifth*, the note of alarm, or war-cry, when a bird of prey appears; *sixth*, the note the parent birds utter to their brood, and the chirp or note of the young. This latter he again divides into two—that which the young birds utter while in the nest and that after they have left it. And to these several utterances he adds the soft, murmuring kind of note which the male emits while he is feeding the female on the nest, and also that uttered by her while receiving the food.

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Barrington remarks that "some passages in the song of a few kinds of birds correspond with the intervals of our musical scale, but that much the greater part of such a song is not capable of musical notation, because—first, the rapidity is often too great, and it is also so uncertain where they may stop, that it is impossible to reduce the passages to form a musical bar in any time whatsoever; secondly, on account of the pitch of most birds being considerably higher than the most shrill notes of instruments of the greatest compass; and lastly, because the intervals used by birds are commonly so minute that we cannot judge at all of them from the more gross intervals into which our musical octave is divided." We shall not follow this accomplished naturalist through the whole of his interesting observations upon this subject. The table which follows will serve to show his estimate of the comparative merits of some of the leading feathered vocalists.

BARRINGTON'S TABLE OF MUSICAL BIRDS.

Designed to exhibit the comparative merit of British Song Birds. Twenty is supposed to be the point of absolute perfection.	Mellowness of tone.	Sprightliness.	Plaintiveness.	Compass.	Execution.
1. Nightingale	19	14	19	19	19
2. Blackcap, or Mock-Nightingale	14	12	12	14	14
3. Skylark	4	19	4	18	18
4. Woodlark	18	4	17	12	8
5. Titlark	12	12	12	12	12
6. Linnet	12	16	12	16	18
7. Goldfinch	4	19	4	12	12
8. Chaffinch	4	12	4	8	8
9. Greenfinch	4	4	4	4	6
10. Thrush	4	4	4	4	4
11. Blackbird	4	4	0	2	2
12. Robin	6	16	12	12	12
13. Wren	0	12	0	4	4
14. Hedge-Sparrow	6	0	6	4	4
15. Reed-Sparrow	0	4	0	2	2
16. Aberdevine or Siskin	2	4	0	4	4
17. Redpole	0	4	0	4	4

There have been frequent attempts to express the calls as well as the songs of birds by words, but we think with little success. To the ears of different persons, these sounds usually suggest very different words. In some cases it is no doubt otherwise. Waterton tells us that in the awful and interminable forests of Demerara, the night-bound stranger sees a spectral shape flit before him suddenly, crying out, "Who are you; who, who are you?" Another instantly approaches, and, as if commanding some infernal agent to apply the lash to a slave, exclaims—"Work away, work away, work away!" A third appears, and mournfully cries—"Willy come go; willy, willy, willy come go!" Wilson tells us that the benighted traveler in our western wilds, seated by his camp-fire, is often saluted by a boding wing sweeping down from the trees, with a cry—"Wagh ho, wagh ho, who cooks for you all?" Buffon says that one of his servants, who slept in a turret of a castle, heard an owl exclaiming—"Poopoo, poopoo, aimé, hemé, edmé," and supposing himself called, replied—"Who are you there below? My name's Peter, not Edmé." There is no mistaking the strange, hurried cry of the Southern goat-sucker—"Chuck Will's Widow! Chuck Will's Widow!" and the "Whip Tom Kelly, Whip Tom Kelly," of the tufted titmouse, is equally distinct.

But there are other notes of birds the sounds or associations of which are more equivocal. To our English ears the monotonous, but still wild and plaintive cry of the whippoorwill, would seem to be unmistakably distinct, but to the ears of the Delaware Indian it was simply a repetition of "Weecollis, weecollis." One man thinks he frequently hears the name of "Jim Richardson, Jim Richardson," in the merry jingle of the boblink; another as definitely makes out the name of "Tom Denney, Tom Denney." The popular school-boy report of his lay is "Bob-o-link, bob-o-link, Tom Denney, Tom Denney, come and pay me the two-and-sixpence you have owed me this year and a half. Come, Tom Denney, Tom Denney; tshe, tshe, tsh, tsh, tshe!" but others consider the impertinent dun as addressed to Jim Richardson. Among the multitude of interpretations of the song of this bird is the following, which seems to us to express much of its jolly, rollicking humor:

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THE O'LINCON FAMILY.*

A flock of merry singing-birds were sporting in the grove;
Some were warbling cheerily, and some were making love;
There were Bobolincon, Wadolincon, Winterseeble, Conquedle,—
A livelier set was never led by tabor, pipe, or fiddle,
Crying, "Phew, shew, Wadolincon, see, see, Bobolincon,
Down among the tickletops, hiding in the buttercups!
I know the saucy chap, I see his shining cap
Bobbing in the clover there,—see, see, see!"

Up flies Bobolincon, perching on an apple-tree,
Startled by his rival's song, quickened by his raillery.
Soon he spies the rogue afloat, curvetting in the air,
And merrily he turns about, and warns him to beware!
"'Tis you that would a-wooing go, down among the rushes O!
But wait a week, till flowers are cheery,—wait a week, and, ere you marry,
Be sure of a house wherein to tarry!
Wadolink, Whiskodink, Tom Denny, wait, wait, wait!"

Every one's a funny fellow; every one's a little mellow;
Follow, follow, follow, follow, o'er the hill and in the hollow!
Merrily, merrily, there they hie; now they rise and now they fly;
They cross and turn, and in and out, and down in the middle, and wheel about,—
With a "Whew, shew, Wadolincon! listen to me, Bobolincon!—
Happy's the wooing that's speedily doing, that's speedily doing,
That's merry and over with the bloom of the clover!
Bobolincon, Wadolincon, Winterseeble, follow, follow me!"

Oh, what a happy life they lead, over the hill and in the mead!
How they sing, and how they play! See, they fly away, away!
Now they gambol o'er the clearing,—off again, and then appearing!
Poised aloft on quivering wing, now they soar, and now they sing:—
"We must all be merry and moving; we must all be happy and loving;
For when the midsummer has come, and the grain has ripened its ear,
The haymakers scatter our young, and we mourn for the rest of the year,
Then Bobolincon, Wadolincon, Winterseeble, haste, haste away!"

All this is very descriptive, but still to other minds, as we have already shown, these songs of the bobolink have suggested not only entirely different sounds, but different associations. And the case is the same, when an attempt is made to write down, by the use of letters, the sportive notes uttered by most other birds. It would be easy to select numerous illustrations of this from books of natural history, but the following will suffice:

"Tioû, tioû, tioû tioù—Spe, tiou, squa—Tiô, tiô, tiô, tiô, tiô, tio, tio, tix—Coutio, coutio, coutio, coutio—Squô, squô, squô, squô—Tzu, tzu, tzu, tzu, tzu, tzu, tzu, tzu, tzu, tzi—Corror, tiou, squa, pipiqui—Zozozozozozozozozozozozozo, zirrhading!—Tsissisi, tsissisisisisisisis—Dzorre, dzorre, dzorre, dzorre, hi—Tzatu, tzatu, tzatu, tzatu, tzatu, tzatu, tzatu, dzi—Dlo, dlo, dlo, dlo, dlo, dlo, dlo, dlo, dlo—Quio, tr rrrrrrrr itz—Lu, lu, lu, lu, ly, ly, ly, ly, liê, liê, liê, liê—Quio didl li lulylie—Hagur, gurr, quipio!—Coui, coui, coui, coui, qui, qui, qui, gui, gui, gui, gui—Goll goll goll goll guia hadadoi—Couigui, horr, ha diadia dill si!—Hezezezezezezezezezezezezezezezeze couar ho dze hoi—Quia, quia, quia, quia, quia, quia, quia, quia ti—Ki, ki, ki, ïo, ïo, ïo, ioioioio ki—Lu ly li le lai la, leu lo, didl ïo quia—Kigaigaigaigaigaigaigaigai guiagaigaigai couior dzio dzio pi."

We think it will be equally surprising to those who have and those who have not heard the Nightingale, to learn that this is given to the world as a literal transcript of the song of that renowned bird, and by one of its greatest admirers and most profound students—the celebrated author of the work on Cage Birds—Dr. Bechstein. An attempt to transcribe the song of our catbird or brown thrush, and still more surely the mocking-bird, would present a similar wilderness of inexpressible syllables. The simple truth is, that the melody of birds can neither be written nor

* From "The Atlantic Monthly" for October, 1858, which has an interesting article on "The Birds of the Orchard and the Garden."

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imitated. "It must be listened to, and that by one whose senses are properly attuned to outward harmony by an indwelling and abiding love of the beautiful and the pure in nature: to him the soaring lark will seem indeed to pour forth at heaven's gate, a morning hymn of praise, and the nightingale to chant amid the leafy woodlands a vesper song of thankfulness: the full chorus of feathered minstrelsy will be to him like an angel choir, scattering melody on all around, which sinks into the soul like summer rain into the earth, gladdening and refreshing it."

We have thus far been speaking of the native melody of birds. But many species are endowed by nature not only with wonderful powers of voice, but with accuracy of ear and powers of memory which enable them to catch and repeat artificial songs. It might be added that many of them are capable of being taught to perform various tricks. Not only the parrot, but many other species, can be so instructed as to imitate the human voice, and articulate words. There is, in truth, no end to the curiosities presented by a careful study of the feathered tribes. Their industry and ingenuity in building their nests, is a theme of admiring wonder alike to the naturalist and the common observer. The forecast of some birds in regard to the coming weather, often seems like prophecy, and they actually perform what the charlatan almanac-maker only pretends to do. The stratagems employed by birds to escape danger, to elude pursuit, and to defend their young, and especially the display of art in the construction of their nests with a view to concealment, are in the highest degree curious and entertaining. Indeed, in whatever way we may view the feathered tribes which surround us, they are a constant source of amusement and instruction. Without them, the world would be divested of one of its greatest and most abiding charms. Not only do they enliven the landscape by their beautiful forms, and varied colors, and graceful motions—not only do they fill the air and enliven the heart by their songs; but some of the more graceful and gifted species often become inmates of our houses, and thus preserve for us, amid the rigors of the winter, glimpses of the departed spring and summer. They thus offer a ceaseless and boundless contribution to the pleasures of the world at large; especially do they furnish an inexhaustible field of delightful inquiry to the scientific student of nature.



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THE GOLDEN EAGLE.

ORDER 1. **RAPTORES.**

The word *Raptores*, from the Latin, signifying *robbers*, but partially characterizes this order, for many of the species are not only robbers, but assassins and butchers. Among the birds of smaller size and gentler aspect, which we call *Passeres*, we shall find instances of species which are exceedingly predaceous in their disposition, devouring not only insects and worms, which in fact constitute a considerable portion of the food of most of them, but also tyrannizing over the smaller birds and other vertebrated animals, in a style which would justify us in applying to them the denomination of birds of prey. It is, however, in the present order that we find the powers of destruction developed to the fullest extent; indeed, the whole structure of the Raptorial birds is evidently adapted to the incessant warfare which they wage upon their neighbors. Nevertheless, some of these birds are of a more peaceful nature, and feed exclusively upon the bodies of animals which they find already dead, although in all their characteristics they are unmistakable members of this order.

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Amongst their distinctive features the most important are those furnished by the bill and feet. The former of these organs is always rather short and strong, with the upper mandible longer than the lower one, strongly hooked at the tip, or curved throughout its whole length, very sharp at the point, and sometimes armed with teeth on the margins. The base of the bill is covered by a cere, in which the nostrils are pierced. The feet are usually short and powerful, composed of four toes, armed with long, curved, and acute claws. With the latter these birds seize their prey in a deadly grasp, and with them they hold the victim whilst the powerful bill is engaged in tearing off portions of its flesh. At the same time, the wings are always of large size, and often of extraordinary length, giving the birds an astonishing rapidity of flight. The tail is long and broad, usually composed of twelve feathers; it is sometimes rounded and sometimes forked at the end.

The tarsi are rarely furnished with scutella as in the Passerine birds, but, like the toes, they are generally covered with a reticulated skin, although in some cases a few scutella are found upon the front of the tarsi and the upper part of the toes. The latter are arranged three in front and one behind, and the anterior toes are usually united at the base by a short membrane, except in the owls, in which the outer toe is capable of being turned backward and the inner one alone is united to the middle toe by a membrane. In some instances the feet are feathered down to the toes. The raptorial birds are very generally distributed over the globe. They vary greatly in size, but the majority feed upon the flesh of animals which they capture for themselves; some of the smaller species, however, condescend to prey upon insects. They are divided into three extensive families, the *Falcons*, the *Vultures*, and the *Owls*.

THE FALCONIDÆ.

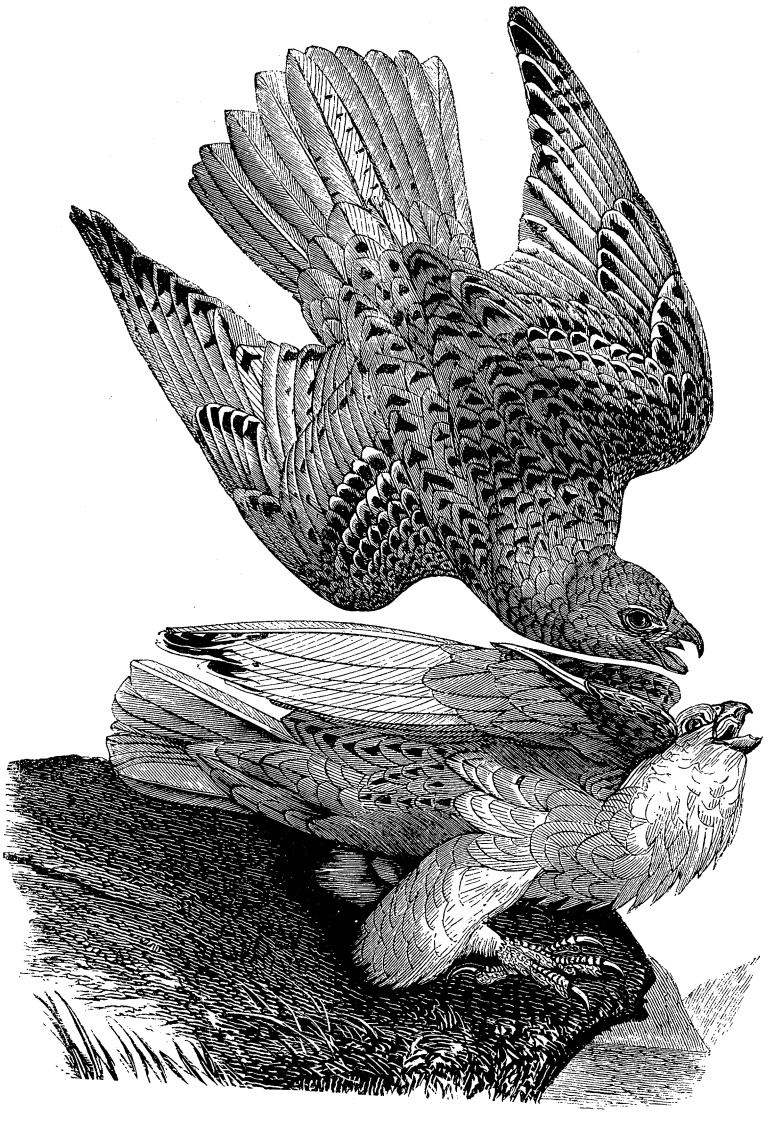
In this family, which not only includes *Falcons* proper, but *Hawks* and *Eagles*, the destructive power is most perfectly developed; and we find in the birds composing it natural instruments for striking, trussing, and dissecting their prey, combined with a power of flight and strength of limbs equivalent to the necessities of the case, whether the prey be aerial—that is, in the act of flight—or on the ground. These natural weapons are rendered still more formidable by the organization of the whole animal, which is calculated to give them the greatest possible effect. The nails, or claws, to be available, must be sharp; and, in order that they may be kept in this state and fit for duty, there is a provision to enable the bird to prevent them from coming in contact with the ground or other foreign hard bodies; for the claws are retractile, not indeed in the same manner as those of the cats, which have the power of withdrawing or sheathing theirs within the integuments, but by a conformation which gives the bird of prey the power of elevating its claws at pleasure. The claws of falcons when sitting on stones or large branches of trees have often a cramped appearance; but this arises in most instances from the care of the bird so to arrange its talons that their points may not be blunted against the perch. It is one of the remarkable characteristics of this family, in common with other Raptores, that the females are considerably larger than the males.



HEAD AND FOOT OF PEREGRINE FALCON.

All the Falconidæ have wings of large size, and are remarkably powerful fliers. They pursue

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THE ICELAND FALCON.

their prey almost entirely on the wing. Their food consists of quadrupeds, birds, reptiles, and insects, which they seize by suddenly pouncing upon them in the air or on the ground; many of the species also feed upon fishes, in pursuit of which they dash down with great force into the water. Their victims are seized by the powerful curved and acute claws, the deadly gripe of which generally destroys life immediately, but the bill is rarely used except to tear the flesh of the prey after it has been secured in the talons. When the animal killed is of small comparative size, the birds generally carry it off to some quiet spot where they may feed upon it without fear of interruption; but when it is too large to be thus disposed of, they gorge themselves with its flesh on the spot where it fell. In either case, however, they usually devour as much of their victim as will completely fill the crop or dilated portion of the œsophagus, and then always retire to some sequestered retreat, where they remain quiet until the food is digested. They generally remove a good portion of the hair or feathers from their prey before commencing their attack upon its flesh; but, notwithstanding, usually swallow some of these indigestible

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THE WHITE FALCON.

articles, together with a part of the bones; all these parts are left behind in the stomach, and are vomited forth in the form of roundish pellets. This habit is common to many other birds, especially shrikes, swallows, and others which feed on hard-winged insects.

The strong feet of the falcons enable them to perch with great ease and security, and, when thus roosting, they sit with the body nearly erect, and the head and neck drawn back in an attitude of considerable elegance; but on the ground the length and curvature of their claws render them rather awkward; they incline the head and body forward, and are obliged to move by clumsy leaps, with the assistance of their wings.

The Falconidæ are generally solitary birds; their cry is loud and shrill, sometimes becoming a scream or yelp, and is usually a sign of anger or triumph. Their nests are rude, flat, and often of large size; they are composed of sticks, twigs, and similar materials, lined with hair, wool, or feathers, in the part destined for the reception of the eggs. These vary in number from two to six or eight; they are usually of a white color, and more or less spotted with dark tints.

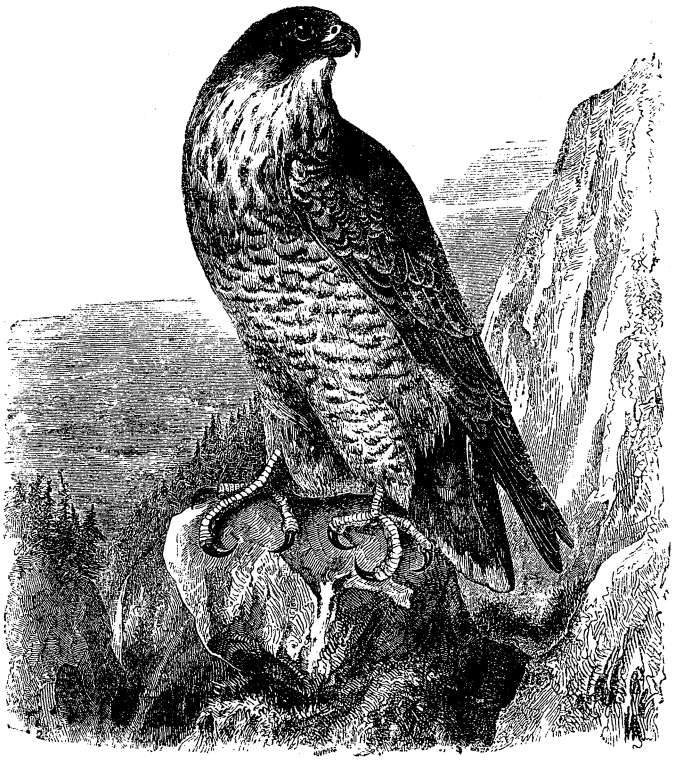
Genus FALCON: *Falco.*—This includes several species, and among them the celebrated birds used in the falconry of the Middle Ages, and called *Noble Falcons*, in distinction from the other species not employed in this pastime, and called *Ignoble Falcons.*

The WHITE FALCON, *F. candicans*, is of a pure white, with heart-shaped spots, and faint transverse bands of a grayish-brown color on the upper parts. The male* is eighteen inches long, from the point of the beak to the tip of the tail. It lives on birds of considerable size, principally those of the gallinaceous kinds. It inhabits the high polar regions of both hemispheres, and was the proper *Jer Falcon* or *Gyr Falcon* of the days of falconry; this and the Iceland falcon were most esteemed by falconers on account of their capacity for education. It was formerly obtained from Northern Europe, but it is now known to be found in Greenland and the Polar Regions of North America; and under the supposition that it was a distinct species, it has been called the *American Gyrfalcon* and the *F. Grœnlandicus.*

The ICELAND FALCON, *F. Islandicus*, is larger than the preceding; it is brown above, barred

* In speaking of the length of a bird we measure from the point of the beak to the tip of the tail; if we mention the length without naming the gender, we mean the largest, which, in the Raptores, is the female; in most others the male.

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THE PEREGRINE OR WANDERING FALCON.

and spotted with white; beneath it is white, with heart-shaped spots, and bands alternately light and dark on the tail. It is a native of Iceland, as its name indicates, but it sometimes migrates to the south, though it is said never beyond 60° north latitude. It builds its nests on the loftiest peaks of the mountains; its eggs, to the number of three or four, are of a light yellowish red, with close ocher-colored spots. Audubon describes two birds, a male and female, which he considers of this species, shot by one of his party on the coast of Labrador, in 1833; a sketch of their figures which he has given is presented at page 17.

The JERFALCON, *F. Gyrfalcon* of Gmelin, is eighteen inches long, of a brownish-blue above and white-spotted beneath. Its proper locality is Norway, but it is sometimes seen in Germany and France. The falconers used to obtain it from the remote, wild rocks of Scandinavia, where it bred. It was less esteemed, however, than the two preceding kinds.

The PEREGRINE or WANDERING FALCON, the *Faucon Pelerin* of the French, the *Wander Falke* of the Germans, *F. peregrinus*, is eighteen inches long, of a brownish ash-color above; beneath, white with longitudinal stripes. It builds on high rocks, generally near the sea-coast, and lays two to four whitish eggs, mottled with brown. It flight is rapid, and it descends on its prey with almost inconceivable velocity. It feeds chiefly on gallinaceous birds, penguins, and water-fowl. It is found throughout Europe.

The three first of the preceding species—that is, the *White Falcon*, the *Iceland Falcon*, and the *Jerfalcon*—though they appear to have been distinguished by falconers in former times, have been regarded as one by many naturalists, but M. Schlegel has shown that they are really distinct. The changes of plumage have led to confusion, so that one of them has frequently been mistaken for the other. In their general qualities all the preceding species resemble each other. All are exceedingly powerful birds, and of almost incredible swiftness of flight. They were all used in falconry; the *Peregrine Falcon*, however, having been much more abundant than the other species, and also of a more docile temper, was most frequently employed. The *White*

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A HAWKING PARTY OF THE MIDDLE AGES.

Falcon, on account of its greater strength and courage, was flown at birds of large size, as cranes, storks, herons, and wild geese. The *Iceland Falcon* had the most bold and rapid flight; it mounted higher and its gyrations were wider than those of the other species; its stoop upon the quarry is described by the old writers on falconry as in the highest degree grand, impetuous, and imposing.

"In the language of falconry," says Yarrell, "the female Peregrine was exclusively called the *Falcon*, and, on account of her greater size, power, and courage, was usually flown at herons and ducks; the male Peregrine, being smaller, sometimes one-third less than the female, was called the *Tercel*, *Tiercel*, and *Tiercelet*, and was more frequently flown at partridges, and sometimes at magpies. Young Peregrines of the year, on account of the red tinge of their plumage, were called—the female a *Red Falcon* and the male a *Red Tiercel*—to distinguish them from the older birds, which were called *Haggarts* or *Intermewed Hawks*."

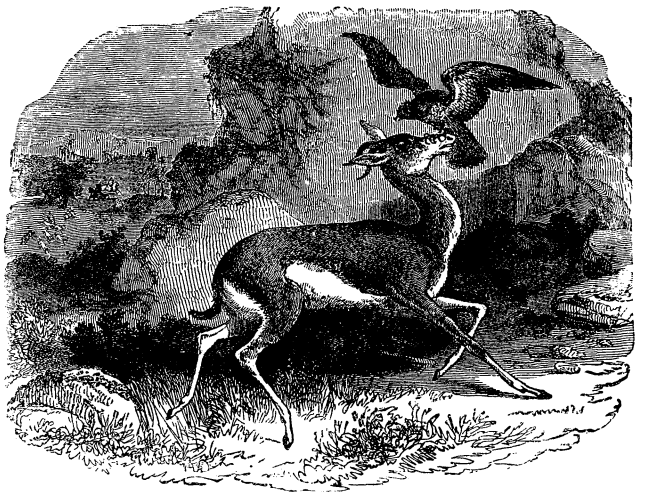
The Lanner, *F. lanarius*, is found in Dalmatia, Hungary, and Greece. It is colored above like the Peregrine Falcon; below it is white, with dark longitudinal spots. It is a rare species. Formerly the King of France, Louis XVI., had Lanners sent annually from Malta; but they were brought from the more eastern countries. It exceeds the Peregrine Falcon in size, being intermediate between that and the Jerfalcon, and was anciently much esteemed for flying at the kite, with which the Peregrine is hardly able to contend. The name of *Lanner* was confined to the female; the male was called a *Lanneret*, on account of its smaller size. Like the other species it builds its nest on high and almost inaccessible rocks.

The Sacred Falcon,* *F. sacer*, considerably larger than the preceding, was also used in falconry. The plumage above is an ashy-brown; below, white, with light reddish spots. It is a rare species, found in Southeastern Europe.

Falconry appears to have been first practiced in the East, and it is still in vogue in Persia and some other Asiatic countries. Though now forgotten in Europe, it was the fashionable sport of the Middle Ages, a favorite with nobles, kings, and fair ladies. So elegant and showy a pastime, and one in the excitements of which the gentler sex could share with the rougher, failed not to become very prevalent, especially in France. In a very old French poem on forest sports,

* All the preceding species belong to Cuvier's genus of *Hierofalco*, a term abridged into *Gyrfalcon*, and signifying *Sacred Falcon;* it is used in allusion to the reverence of the ancient Egyptians for certain birds of prey.

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FALCON ATTACKING A GAZELLE.

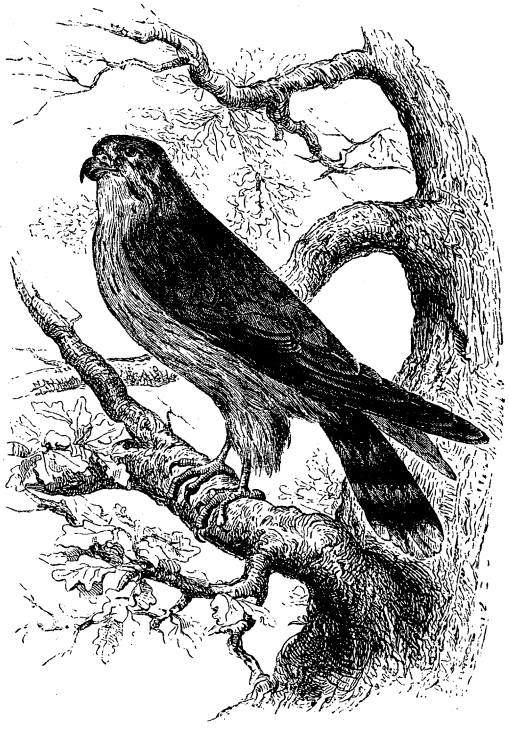
falconry is compared with hunting, and the preference given to the former, because "queens, duchesses, and countesses are allowed by their husbands to carry the falcon on their wrists without offending propriety, and they can enjoy all the sport of this kind of hunting, while, in hunting with hounds, they are only allowed to follow by the wide roads or over open fields, in order to see the dogs pass.

"The knight, on such occasions, was anxious to pay his court to the ladies by his attentions to the falcons. He was obliged to be careful to fly the bird at the proper moment, to follow it immediately, never to lose sight of it, to encourage it by calls, to take the prey from it, caress it, put on the hood, and place the impetuous bird gracefully on the wrist of his mistress."

The training of a bird for this sport was a very critical process; there were persons very learned in it, and who even wrote treatises on falconry, which were deemed a fit and necessary study for an accomplished gentleman. The birds destined to this sort of training for the chase, were taken from the nest when quite young, and for months were nourished with the flesh of pigeons, and also of wild birds, given to them raw. Much time and pains were then spent in teaching them to sit on the hand, by practicing them in perching upon posts, movable bars, &c. To tame them into obedience to the will of the master, they were deprived of sleep and food, were beaten, and otherwise tyrannized over, till the creatures found that absolute submission to the word of command was by far the least of two evils. The same persevering government inured them to wear a leather hood over their heads. To practice them in their art, and without the risk of their flying away, they were attached to a string some two hundred feet long till they were so far disciplined as to be trusted with liberty, and yet relinquish it on the instant at a given signal.

When brought out for use into the open country their heads were hooded, and they were allowed to see nothing but their game; as soon as the game was put up by the dogs, or indicated by them, the powerful bird was tossed from the wrist, and darted straight toward it; if a quadruped, it pounced upon its head, or seated itself there, and pecked the eyes of the victim, till, bewildered and terrified, it fell an easy prey. If a bird were the quarry or object of chase, the scene became very animated and exciting. Picturesquely scattered over the fields could be seen stately dames, with their proud and beautiful faces eagerly upturned, beaming piquantly, perhaps with a little of the ferocity of the age; gay squires on their daintily caparisoned steeds, cheering the falcon to exert his utmost swiftness and prowess; noble personages relaxing from their dignity to watch maneuvers that must often remind them, in miniature, of their own pursuits—all these on high-mettled but well-managed steeds, while around, the crowd of low degree filled the welkin with their boisterous clamor.

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THE MERLIN. (See page 26.)

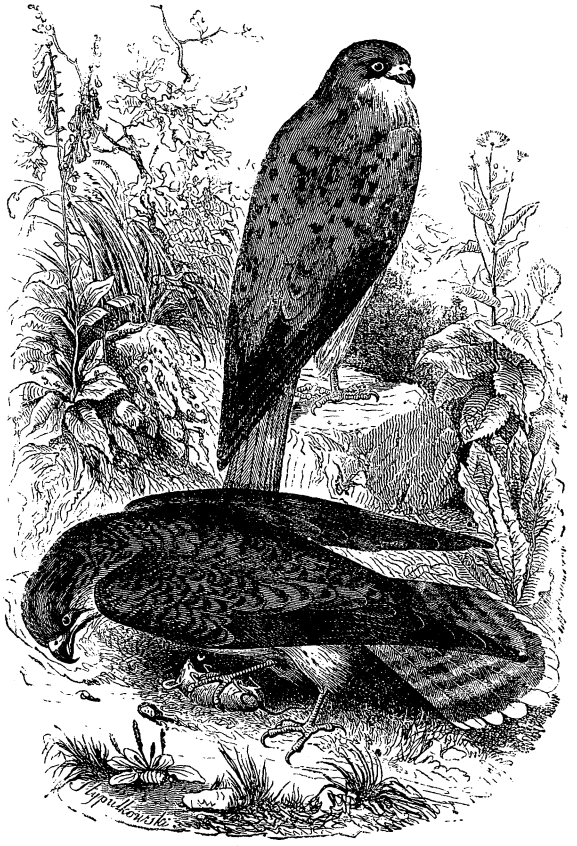
The expense of the hawking establishment was sometimes enormous. Under Francis I. of France, the "flower of chivalry"—whose ambition it was to be the arbiter of elegance, the mirror of his age, first in every manly sport, courtly pastime, or gay adventure—incredible sums were devoted to this one amusement. His training establishments were in charge of a *Grand Falconer*, whose salary was four thousand livres, and who had subordinate to him fifteen noblemen and fifty falconers, with the care of three hundred falcons. The yearly cost of the whole was fifty thousand livres.

Hawking was introduced into England as far back as the tenth century, and appears to have flourished from the time of the Heptarchy to that of Charles II. Soon after the Norman conquest it seems to have been at its height. At that time there was a nice adaptation of the different kinds of falcons to the different ranks. Thus, one species of hawks was for kings, and could not be used by any person of inferior dignity; another was for princes of the blood, and others for the dukes and great lords, and so on down to the knave or servant. In all there were fifteen grades.

The great conquerors of Asia were even more magnificent in the expenses of falconry. The Emperor of China is attended, in his sporting progresses into Tartary, by his Grand Falconer, with one thousand subordinates, and every bird has a silver plate fastened to its foot with the name of the falconer who has charge of it, so that if lost it may be returned to the proper person; but if he cannot be found it must be handed to a special officer, called the *Guardian of Lost Birds*, who keeps it till it is demanded by the falconer to whom it belonged. The Grand Falconer, the more easily to be found among the army of hunters, erects a conspicuous standard.

The American Peregrine Falcon, *F. anatum*, so closely resembles the European Peregrine Falcon that it was long considered to be identical with that species. It is generally known by the various names of *Hen-Hawk*, *Chicken-Hawk*, *Big-footed Hawk*, and *Duck-Hawk*, in this country. It is brown above, with transverse bands of deeper tint; the throat is white; the breast white, tinged with rose-color, and marked with narrow black longitudinal lines; the lower parts

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THE KESTREL. (See page 26.)

are banded across, on an ash-colored ground. The length is about twenty inches. It builds in remote forests or on rocky peaks, and lays two to four eggs. It feeds on grouse, pheasants, partridges, pigeons, ducks, and geese. It is common in all the United States, especially along the sea-coast. Audubon speaks of it in Louisiana, and Richardson in the region of Melville Island. Wilson gives us a lively description of the manner in which this fine and powerful bird darts down upon the ducks along the shores of New Jersey and Pennsylvania, carrying terror and dismay among the myriad flocks that gather at particular seasons in that quarter. In the breeding time it retires to the gloomy cedar swamps, on the tall trees of which it constructs its nests and rears its young, secure from all molestation. In these wilds, which present obstacles almost insuperable to the foot of man, the screams of this bird, occasionally mingled with the hoarse tones of the heron and the hooting of the Great Horned Owl, echoing through the dreary solitude, arouse in the mind all the frightful imagery of desolation.

The WESTERN PEREGRINE FALCON, *F. nigriceps*, found in lower California and Chili, greatly resembles the preceding, but is smaller.

The AMERICAN LANNER FALCON, *F. polyagrus*, is brown above and white below; the length is twenty inches; found in California, on the Platt River, and near Puget's Sound.

The HOBBY or HOBBY-FALCON—the *Hobereau* of the French—*F. subbuteo*, formerly used in hawking at larks and quails, is eleven inches long, of a bluish ash-color above, white below, tinged with red. It builds in lofty trees, or in the crevices of high rocks, laying three or four reddish-white eggs. It is found in Southern Europe and Northern Africa, and feeds largely upon larks, which it captures by soaring above and then pouncing down upon them. It also devours other small birds, and frequently condescends to sup on frogs, beetles, and crickets. Swallows have such fear of this hawk that when pursued by it they sometimes fall insensible to the ground from mere fright.

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The KOBEZ, INGRIAN, or RED-LEGGED FALCON, *F. vespertinus*, is ten and a half inches long, of a bluish-gray above and red beneath. Unlike other falcons, all of which live solitary or in pairs, this species often congregates in flocks. It builds in tall trees, lays three or four eggs, and is found all over Europe, but is most abundant at the north.

The BENGAL FALCON or MARTIN FALCON, *F. cœrulescens*, is the smallest species of falcon that is known; it is of a bluish-black above and red beneath. The tail is crossed by four white lines. It is found in India and Sumatra.

The CHICQUERRA FALCON, *F. Chicquerra*, is ashy-gray above and white beneath, striped with light gray. It is found in Java, in India and South Africa.

The RUFOUS-BACKED KESTREL or MOUNTAIN FALCON, *F. rupicolus*, resembles the kestrel, and is found at the Cape of Good Hope.

The CRESTED FALCON, *F. frontalis*, is of a steel-gray above; below it is of the same color, with cross-bands of a darker tint. It is remarkable for its crest, which rises and falls according to the passions which agitate it. It lives upon the borders of the sea, in which it fishes for crabs and shell-fish. It builds its nest on the rocks, and lays four or five eggs of a reddish-white color. It is found in Southern Africa.

The BLACK-THIGHED FALCON, *F. tibialis*, is an African species of the size of a pigeon, of a grayish-brown above and a light red below.

The RED-THIGHED FALCON, *F. femoralis*—the *Lead-colored Merlin* of Azara—is a South American species, of a blackish lead-color above and lead-colored below. It builds on isolated trees, and lays four or five eggs.

The LITTLE FALCON or AMERICAN SPARROW-HAWK—the *St. Domingo Merlin* of Buffon—*F. sparverius*, is spread over the greater part of both North and South America, and is familiarly known in the United States. It is reddish-bay above, transversely streaked with black; the lower parts yellowish-white, marked with longitudinal lines of brown. It flies rather irregularly, occasionally suspending itself in the air, hovering over a particular spot for a minute or two, and then shooting off in another direction. It perches on the top of a dead tree or pole in the middle of a field or meadow, and, as it alights, shuts its long wings so suddenly that they seem instantly to disappear; it sits here in an almost perpendicular position, sometimes for an hour at a time, frequently jerking its tail, and reconnoitering the ground below, in every direction, for mice, lizards, &c. It approaches the farm-house, particularly in the morning, skulking about the barn-yard for mice or young chickens. It frequently plunges into a thicket after small birds, as if by random, but always with a particular, and generally a fatal aim. It is particularly fond of watching along hedge-rows and in orchards, where various kinds of small birds usually resort. When grasshoppers are plenty they form a considerable part of its food. The male is ten inches long. This species lives on grasshoppers, snakes, mice, lizards, and small birds. The blue jays have a particular antipathy to this bird, and frequently insult it by following and imitating its notes so exactly as to deceive even those well acquainted with both. In return for all this abuse, the hawk contents himself with now and then feasting on the plumpest of his persecutors, who are, therefore, in perpetual dread of him; and yet, through some strange infatuation, or from fear that, if they lose



HEAD AND FOOT OF AMERICAN SPARROW-HAWK.

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SPARROW-HAWKS.

sight of him, he may attack them unawares, the sparrow-hawk no sooner appears than the alarm is given, and the whole posse of jays follow.

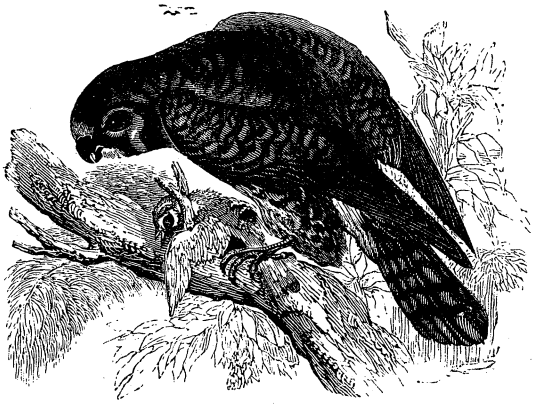
The American Pigeon-Hawk, *F. columbarius*, is migratory in its habits, returning to the Southern States about November, and in summer extending its excursions as far north as Hudson's Bay. It is eleven inches long, the upper parts being of a dark brown; the lower parts brownish-white, streaked with dark brown; the legs are yellow; the claws black. Small birds and mice are its principal food. When, toward autumn, the reed-birds, grackles, and red-winged blackbirds congregate in large flights, it is often observed hovering in their rear, or on their flanks, picking up the weak, the wounded, or stragglers, and frequently making a sudden and fatal sweep into the very midst of their multitudes. The flocks of robins and pigeons are honored

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with the same attentions from this marauder, whose daily excursions are entirely regulated by the movements of the flocks on whose unfortunate members it fattens. The bird which Audubon called the *Little Corporal*, in honor of Napoleon, was an old male of this species.

The MERLIN—*Emerillon* of the French—*F. Æsalon*, is a small species of hawk, nine or ten inches long, of an ashy-blue above, below white striped with brown. It builds on lofty trees, and lays five or six eggs This bird, on account of its docility, was formerly used for hawking at larks, quails, partridges, and pigeons. Its skill and courage in pursuing them excited great admiration among the sportsmen. It inhabits the south of Europe in winter and the north in summer. (See page 22.)

The KESTREL, called *Windhover* in England—the *Crecerelle* of the French; *F. tinnunculus* of Linnæus—is about a foot in length; its color is a reddish-brown above, marked with angular black spots; beneath it is reddish, with longitudinal rays on the breast. It is widely spread over Europe, and was formerly used in falconry. It lives on mice, lizards, insects, and small birds. It makes its nest in the trees of forests, and also sometimes in old towers and walls. It lays five or six eggs, and is an abundant breeder. (See page 23.)



THE LESSER KESTREL.

The LESSER KESTREL—the *Crécerine* of the French—*F. cenchris*, is eleven and a half inches long, and resembles the preceding in color. It inhabits the coasts of the Mediterranean in winter, and migrates northward in summer. It makes its nests in rocks and old castles, and lays three or four eggs.

There are a number of other species, variously arranged by different naturalists, but which we shall include in this genus, among which are the BLACK FALCON, *F. subniger;* the SULTAN FALCON, *F. peregrinator*, much used for falconry in India; the SALAKOO FALCON, *F. peregrinoides;* the DOUBLE-BEARDED FALCON, *F. cervialis;* the JUGGER FALCON, *F. jugger;* the SEVERE FALCON, *F. severus;* the RED-NECKED FALCON, *F. rufigularis;* the PARAMATTA FALCON, *F. frontatus;* the UNIFORM FALCON, *F. concolor;* the CREAM-BELLIED FALCON, *F. berigora;* the NEW ZEALAND FALCON, *F. Novæ Zealandiæ;* the ROCK FALCON, *F. rupicoloides;* the SPOTTED FALCON, *F. punctatus;* the NANKIN HAWK, *F. cenchroides;* and the CINNAMON FALCON, *F. cinnamomeus.*

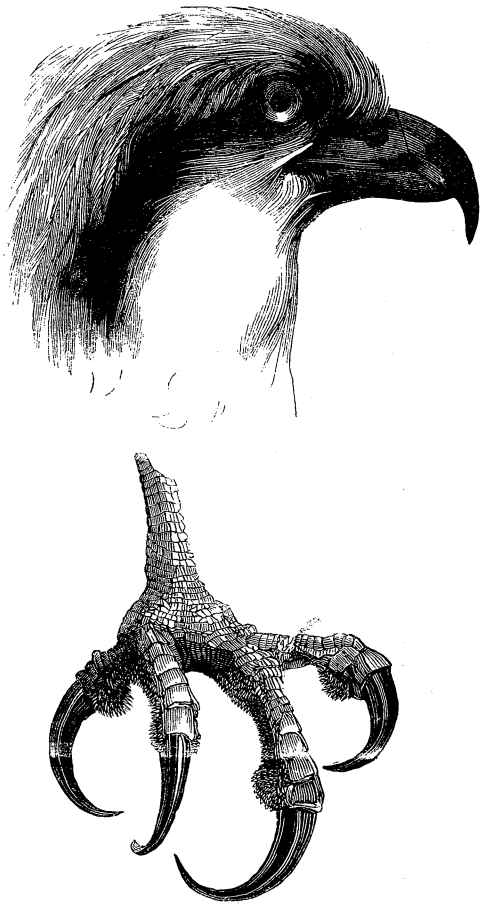
Genus ELANUS: *Elanus.*—The birds of this genus resemble the falcons in the sharpness of their wings and some other respects. The BLACK-SHOULDERED HAWK or WHITE-TAILED HAWK, *E. leucurus*—the *Falco dispar* of Temminck—is an abundant species in the Southern and South-western States: the upper parts are of a fine ash-color; the lesser wing-coverts glossy black; length of the female sixteen to seventeen inches.

The BLACK-WINGED FALCON or BLACK-WINGED SWALLOW-HAWK, *E. melanopterus*, found in Africa, India, and Australia, is smaller than the preceding, with which it has been confounded. Its plumage is soft and silky, and ash-colored above; the tail is slightly forked. It lives chiefly on insects, which it captures on the wing. Other species are the AXILLARY FALCON, *E. axillaris*, and the LETTER-WINGED FALCON, *E. scriptus.*

Genus PANDION: *Pandion*, comprises three or four species: in these the bill is short and curved from the base; the wings are very long; tarsi short, thick, and strong, and covered with small circular scales; the claws are sharp and curved; the tail of moderate length.

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The Osprey, Bald Buzzard, or Fishing Eagle—*Balbusard Offraye* of Le Maout; *Falco haliaetus* of Linnæus—*P. haliaetus*, is a large and powerful bird; the female, being a quarter larger than the male, measures twenty-five inches and weighs five pounds. The plumage is white below, with a few brown streaks and speckles on the throat; the whole of the upper part is brown; the feathers on the thighs are close, and the legs short, stout, and grayish. In this part of its organization we see a beautiful instance of adaptation to its habits. The close thigh-feathers resist the action of the water, in which it plunges for its prey, while the talon of the outer toe is much larger than the inner one, and capable of being turned backward; the under surfaces of all the toes are also very rough, and covered with protuberances, which enable it to secure its slippery prize.



HEAD AND FOOT OF THE OSPREY.

This bird usually flies at a considerable height, and lives chiefly on fishes, which it seizes along the sea-shore or in ponds and lakes, by descending upon them and bearing them off in its talons. It however occasionally seizes upon sea-fowl. Its strength is so great that it will lift from the water and carry away a fish of its own weight. Its greediness is said sometimes to exceed its discretion, for it occasionally buries its talons in a fish too heavy to be borne away, and being unable or unwilling to extricate them, is carried beneath the water and drowned. This species is migratory, and is generally distributed throughout Europe, and in some places is abundant; it is also found in parts of Africa and Asia.

Other foreign species of this genus are the White-headed Osprey, *P. leucocephalus;* the Marine Eagle, *P. ichthyaetus;* and the Small Marine Eagle, *P. humilis.*

The American Osprey, popularly known among us as the Fish-Hawk, *P. Carolinensis*, has been generally considered as identical with the European species, but it is said to be somewhat larger, the female measuring thirty inches, and the marks on the breast being heart-shaped and circular instead of narrow and lanceolate, as in the European osprey. It is abundant on the sea-coasts and those of the interior waters of the United States. Wilson says: "This formidable, vigorous-winged, and well-known bird subsists altogether on the finny tribes that swarm in our bays, creeks, and rivers, procuring his prey by his own active skill and industry, and seeming no further dependent on the land than as a mere resting-place, or, in the usual season, a spot of deposit for its nest, its eggs, and its young." It is migratory, arriving on the coasts of the Middle States late in March; its arrival is regarded by the fishermen as the happy signal of the return of the vast shoals of herring, shad, and other fishes which it follows, and on which it preys. In Europe the osprey builds on the ground, or on rocks and old ruins; here it makes its nest in the top of decayed trees. This consists externally of a huge mass of sticks, each from half an inch to an inch and a half in diameter and two or three feet long; these are piled four feet high, and are intermixed with corn-stalks, sea-weed, turf, mullen-stalks, and the like, the whole being lined with grass. The huge structure is visible for half a mile.

"Unlike other rapacious birds," says Nuttall, "the ospreys may be almost considered gregari-

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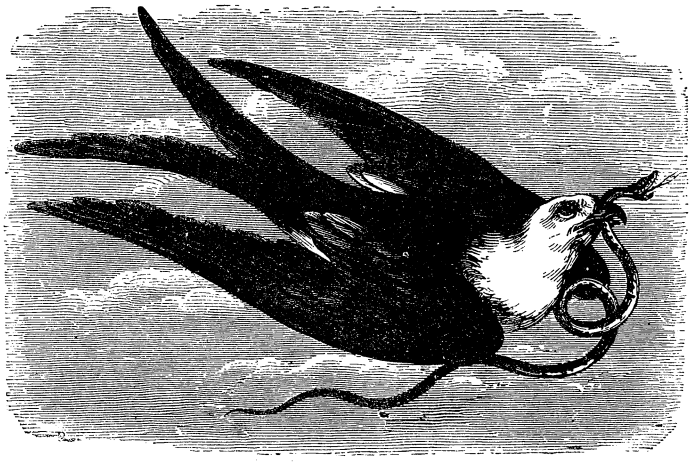
THE OSPREY.

ous, breeding so near each other that, according to Mr. Gardiner, there were on the small island on which he resided, near to the eastern extremity of Long Island, New York, no less than three hundred nests with young. Wilson observed twenty of their nests within half a mile. I have seen them nearly as thick about Rehoboth Bay, in Delaware. Here they live together at least as peaceably as rooks, and so harmless are they considered by other birds, that, according to Wilson, the crow blackbirds or grakles are sometimes allowed refuge by the ospreys, and construct their nests in the very interstices of their eyry. It would appear sometimes that, as with swallows, a general assistance is given in the constructing of a new nest, for, previous to this event, a flock have been seen to assemble in the same tree, squealing, as is their custom when any thing materially agitates them."

The eggs, from two to four, are laid in May, and are usually of a creamy white, marked with brown spots, and are somewhat larger than those of a common fowl. Wilson says: "On the appearance of the young, which is usually about the last of June, the zeal and watchfulness of the parents are extreme. They stand guard and go off to fish alternately, one parent being always within a short distance of the nest. On the near approach of any person, the hawk utters a plaintive, whistling note, which becomes shriller as she takes to wing and sails around, sometimes making a rapid descent, as if aiming directly for you; but checking her course, and sweeping past at a short distance over head, her wings making a whizzing in the air. My worthy friend Mr. Gardiner informs me that they have even been known to fix their claws in a negro's head who was attempting to climb to their nest." Many other instances are recorded of the fierceness with which these birds defend their nest and their young.

Genus HARPAGUS: *Harpagus* of Vigors.—This includes two species; the NOTCHED FAL-

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THE FORK-TAILED KITE.

CON, *H. bidentatus* is found in Guiana and Brazil; it is brown above and ashy-gray beneath; its bill is short, and the upper mandible has two notches or teeth; the body is a foot in length. This bird lives in the borders of woods, feeding on birds, reptiles, and small quadrupeds. In its habits it is rather indolent, its flight being slow and never prolonged. The other species is the TWO-TOOTHED FALCON, *H. diodon.*

Genus IERAX: *Ierax.*—Under this genus the British Museum Catalogue gives the following: the BENGAL FALCON, *I. cœrulescens*, which we have noticed at page 24; the SILKY FALCON, *I. sericeus*, and the WHITE-NAPED FALCON, *I. eutolmus.*

Genus NAUCLERUS: *Nauclerus.*—This includes the SWALLOW-TAILED HAWK or FORK-TAIL, *N. furcatus;* it is twenty-five inches long; the wings and tail black; neck and under parts white; the tail-feathers, twelve in number, are deeply forked, the lateral ones excessively elongated. It feeds on snakes, lizards, and frogs; it devours also grasshoppers, locusts, and wasps, making attacks on the nests of the latter. It builds its nest of dry sticks on the top of a tall oak or pine near a stream; the eggs are four to six, and of a grayish-white. The male and female sit alternately. They feed on the wing, and often soar to an immense height, their evolutions in the air being peculiarly graceful. This species is common in the Southern and Southwestern States, and also in the Western States, as far north as Wisconsin. It is also occasionally, but very rarely, found in Europe. It is migratory in this country, arriving in large flocks in April, at the same time uttering a sharp, plaintive cry; it departs in September.

There are two other species of this genus, one African, the other South American; the latter, *Elanoides yetapa*, resembles the fork-tail above described, and is perhaps only a variety of it.

Genus ICTINIA: *Ictinia.*—This includes two species. The MISSISSIPPI KITE, *I. Mississippiensis*, is fourteen inches in length, and has a spread of wing of three feet. The head and neck are hoary white, the back blackish-ash, the under parts whitish-ash; the rump and tail are black, the latter slightly forked. It is found in the Southern and Southwestern States, where it may be seen sailing in large circles in the air in company with turkey-buzzards.

The SPOTTED-TAILED HOBBY, *I. plumbea*, is a South American species, differing from the preceding, but has often been confounded with it.

Genus MILVUS: *Milvus.*—This includes several species, the most prominent of which is the COMMON KITE OF EUROPE—the *Milan Royal* of the French; *Nibbio* of the Italians; *Rother-Milan* of the Germans—*M. regalis.* In some parts of England it is called *Puttock.* Its length is twenty-six inches; its color above dark brown; rufous-brown below; the tail long and deeply forked. It sails gracefully in the air, now describing circles, and anon with outspread tail remaining stationary. It pounces on its prey, consisting of moles, mice, leverets, rabbits, unfledged birds, and the young of the gallinaceous tribe especially. It was formerly a great scourge to the poultry-yard. It will also eat frogs, snakes, and fish. The nest, made of sticks and lined with soft materials, is usually built on the fork of a tree in a thick wood. The eggs are two, sometimes

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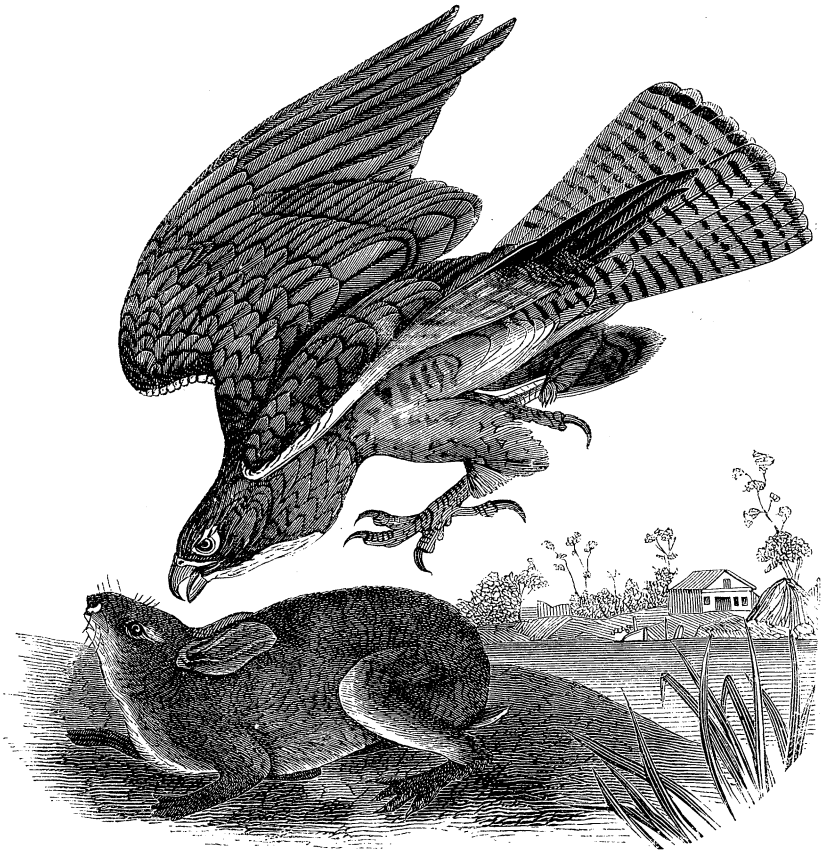
THE KITE.

three, of a dirty white, with a few reddish-brown spots at the large end. The female lays early in the season, and she often makes a vigorous defense when her nest is attacked. This species is common in Middle Europe and Northern Asia. It was formerly used in falconry.

The BLACK KITE, *M. œtolius*, is common in Russia, and is found in the Caucasus and in Africa; the PARASITIC KITE, *M. parasiticus*, is smaller than the common kite, and is found both in Europe and Africa. Other species are the GOVINDA KITE, *M. Govinda;* AUSTRALIAN KITE, *M. affinis;* the ARABIAN KITE, *M. Ægyptius.*

Genus BUZZARD: *Buteo.*—These birds have a short bill wide at the base, wings long and wide, tail rather wide, claws strong. There are nearly thirty species, inhabiting all countries. The COMMON BUZZARD of Europe—*Buse* of the French, *Falco Pojana* of the Italians, *Mause-Falk* and *Wald-Geyer* of the Germans—*B. vulgaris*, is twenty-two inches long; the head is large and the body heavy. Above, the color is chocolate-brown; grayish-white beneath. The feathers are soft and downy in texture, and as this bird preys late in the evening, it is deemed an approximation to the owls. Its flight is low, and much of its time is spent in sitting on trees, in wooded districts, awaiting its prey, which consists of small quadrupeds, birds, reptiles, insects, and earth-worms. Its nature is slothful and cowardly, but it is very devoted to its young. If the female be killed, the male will rear the brood. In England it builds its nest in the fork of a tree; in Scotland on the brows of rocks and precipices. It seems to be capable of some education, and such is its turn for incubation, that in a state of partial domesticity, it has built a nest, and hatched the eggs of hens, taking care of the young as if they were its own. This species is common all over the wooded districts of Europe, and in some parts it is abundant: it is found in Northern Asia, and in the northern parts of North America, though here it seems rare. Richardson states that it arrives in the fur countries, from the South, in the middle of April, very soon afterward begins to build its nest, and, having reared its young, departs about the end of September. Here it haunts the low alluvial points of land which stretch out under the high banks of rivers, and may be observed for a long time motionless on the bough of a tree watching for some small quadruped, bird, or reptile, to pass within its reach. As soon as it espies its prey, it glides silently into the air, and sweeping easily but rapidly down, seizes it in its claws. When disturbed, it makes a short circuit, and soon settles on another perch. One of Sir John's specimens had two middle-sized toads in his crop. It builds its nest on a tree, of short sticks, lining it with deer's hair. The eggs are from three to five in number.

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THE COMMON BUZZARD OF EUROPE.

The *Falco albidus*, and *F. versicolor*, are varieties of the Common Buzzard.

The following additional foreign species are from the catalogue of the British Museum: The AFRICAN BUZZARD, *B. tachardus;* the LONG-LEGGED BUZZARD, *B. rufinus;* the JACKAL FALCON, *B. jackal;* the NORTH AFRICAN BUZZARD, *B. augur;* the HALF-BOOTED BUZZARD, *B. plumipes;* the RED-BACKED BUZZARD, *B. erythronotus;* the BANDED-SIDED HAWK, *B. pterocles;* the WHITE-SPOTTED BUZZARD, *B. albonotatus;* the WHITE-FACED BUZZARD, *B. leucops;* the EQUINOCTIAL EAGLE, *B. equinoctialis;* the PAMENA EAGLE, *B. nigricollis;* the STREAKED FALCON, *B. melanops;* the WHITE-NECKED FALCON, *B. albicollis;* the BRAZILIAN BUZZARD, *B. scotopterus;* the GRAY-BACKED BUZZARD, *B. polionotus*, and *B. busarellus.*

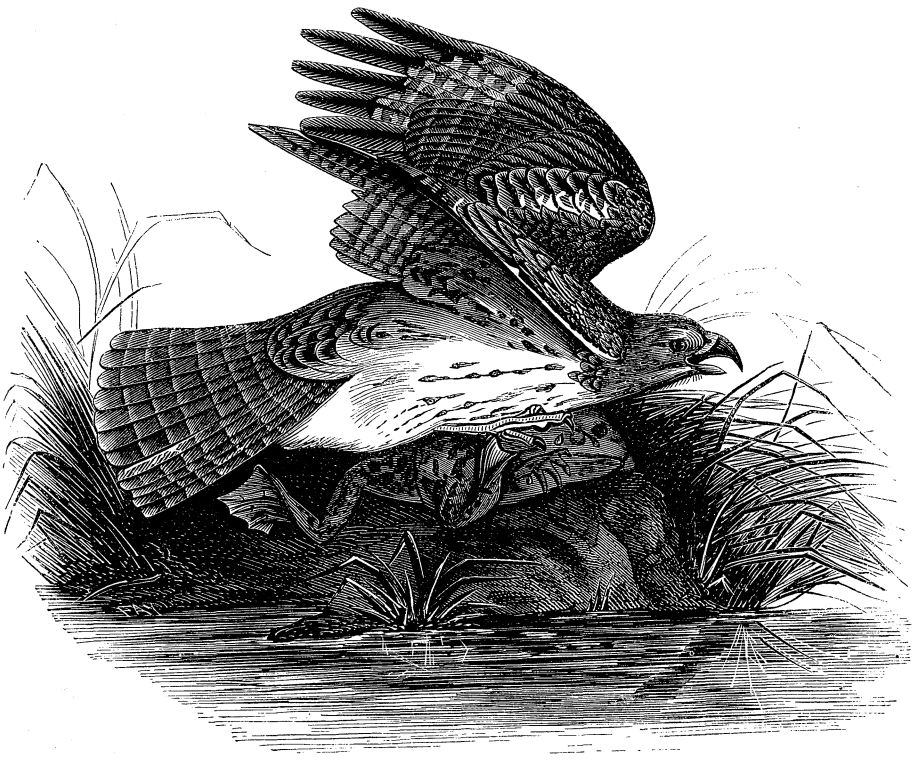
The AMERICAN BUZZARD, or RED-TAILED HAWK, *B. borealis*, is twenty-two inches long, makes its nest in high trees, lays four eggs of a dark white, blotched with brown; upper parts dark umber brown; lower parts fawn-color. It inhabits the whole United States, and remains through the winter in Pennsylvania. It feeds on birds and small quadrupeds, and frequently carries off hens and chickens from the poultry-yard.

The WESTERN BUZZARD, *B. Swainsoni*, or *B. montanus*, resembles the preceding, but is rather larger, and has wider wings; length twenty-three to twenty-six inches; found in the Rocky Mountains, Oregon, Wisconsin, Missouri, &c.

The RED-SHOULDERED HAWK, or WINTER FALCON, *B. lineatus*, is smaller than the preceding; the upper parts are brown, under parts rufous; tail brownish-black, with transverse bands of white; length twenty-two to twenty-four inches; found in California, Wisconsin, and South Carolina.

Other American species are as follows: the *B. Bairdii*, found in Wisconsin; the BROAD-WINGED HAWK, or BROAD-WINGED BUZZARD, *B. Pennsylvanicus*, *Falco latissimus* of Wilson—a handsome species, found sparsely in the Middle States, and more abundantly in Wisconsin; HARLAN'S

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THE RED-SHOULDERED HAWK.

Buzzard, or Black Warrior, *B. Harlani*, found in Louisiana, Mexico, and Central America; and the Canada Buzzard, *B. insignatus* of Cassin, a small species recently brought to notice.

Genus ARCHIBUTEO: *Archibuteo;* that is, *Buzzard, par excellence.* Of this there are several species, all similar to those of the preceding genus, but distinguished by a tarsus densely feathered to the base of the toes, yet more or less naked on the hind part.

The Rough-legged Falcon, or Black Hawk, *A. Sancti Johannis—Falco niger* of Wilson, *St. John's Eagle* of the British Museum Catalogue—is an abundant species in the Atlantic States, and is found in all the northern parts of North America. Its length is about twenty-two inches; its colors are very variable.

The Rough-legged Buzzard, *A. lagopus*, is similar to the preceding. Above it is light umber-brown, beneath yellowish-white; length twenty-one to twenty-three inches; found in Europe, and probably in the United States, though the bird met with here and regarded of this species, may be the young of the *A. Sancti Johannis.*

The Western Rough-legged Buzzard, or Cacique-Buzzard, *A. ferrugineus*, is twenty-three to twenty-five inches long, and is an extremely handsome species; found in California.

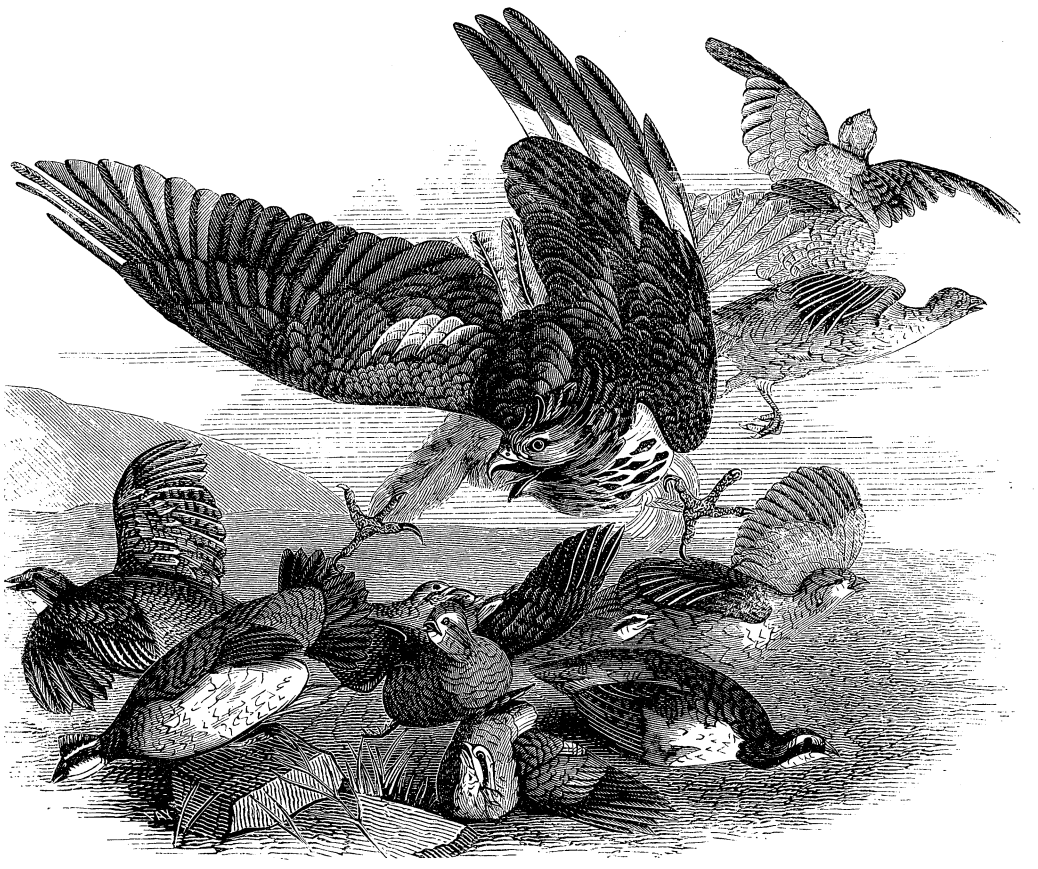
The White-breasted Buzzard, *A. strophiatus*, is a European species.

Genus PERNIS: *Pernis;* this includes the Honey-Buzzard—the *Bondrée* of the French, *Wespen-Buzard* of the Germans—*P. apivorus;* the length is two feet, the upper parts ashy-brown, beneath, white spotted. It feeds on mice, moles, hamsters, birds, reptiles, wasps, and other insects, also on the larvæ of bees, whence it gets its popular name. This species is found sparsely in the central portions of Europe.

The Crested Honey-Buzzard, *P. cristata*, is found in the Indian Archipelago.

Genus CIRCUS: *Circus*, includes at least a dozen species, mostly foreign, which bear the general name of *Harriers.* The Hen Harrier of Europe—the St. Martin's Bird of the French—*C. cyaneus*, is fourteen inches long; general color ashy-gray, but variable; builds its nests in forests in marshy regions; lives on frogs, lizards, rats, partridges, and young aquatic

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THE AMERICAN MARSH HAWK ATTACKING A FLOCK OF QUAILS.

birds; also on house pigeons and poultry. It lays six whitish eggs; inhabits all Europe. The MARSH HARRIER, *C. rufus*, or *C. æruginosus*, inhabits Europe and the North of Africa. MONTAGU'S BUZZARD, *C. Montagui*, is also a European species. The RANIVOROUS FALCON, *C. ranivorus*, is found in North Africa. Other species are QUOI'S BUZZARD, *C. cinereus;* the BLACK AND WHITE INDIAN FALCON, *C. melanoleucus;* the LONG-LEGGED FALCON, *C. acoli;* the BLACK HEN HARRIER, *C. ater;* the ASH-COLORED FALCON, *C. cinerescens;* the PALE-CHESTED HARRIER, *C. Swainsonii;* JARDINE'S HEN HARRIER, *C. Jardinii;* the SALVADOR FALCON, *C. macropterus;* and the ALLIED MOOR BUZZARD, *C. assimilis.*

The AMERICAN HARRIER, or MARSH HAWK, *C. Hudsonius*, resembles the *C. cyaneus* of Europe, but it is larger, and its colors are different. It is nineteen to twenty-one inches long; is of a pale gray color, beneath white, with small reddish spots. It is found in all North America.

Genus HERPETOTHERES: *Herpetotheres.*—This term signifies *reptile-chaser*, and describes the habits of the only species, in respect to food; this is the LAUGHING FALCON of Guiana and the neighboring country, *H. cachinnans*—the *Macagua* of Azara. It is brown and white above, and ten inches in length. Its aspect is somewhat owlish. It lives in the borders of forests along rivers and marshes, where it builds its nest of enormous dimensions. When it sees a man approaching its domains, it cries out *ma-ca-gua*, with a sort of laughing accent.

Genus ASTUR: *Astur.*—This includes several species, distributed in various countries, and generally called *Goshawks.* They are distinguished by a slender form, the bill short, curved, and festooned; wings moderate; tail long and broad. The COMMON GOSHAWK of Europe—*Autour* of the French; *Sparviere Terzuolo* of the Italians; *Grosser Gepfeilter-Falck* of the Germans—*A. palumbarius*, is twenty-three to twenty-four inches long, the males usually one-fourth less;

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THE GOSHAWK.

color above dark grayish-brown; beneath ashy white. Its food consists of hares, rabbits, pigeons, pheasants, grouse, partridges, &c. It flies low, makes its nest in a high tree in the edges of forests, and lays three or four eggs in May. It was formerly trained to falconry. The *Falcon gentil* of the writers on falconry, was probably the young of this species. It is common in all Northern Europe.

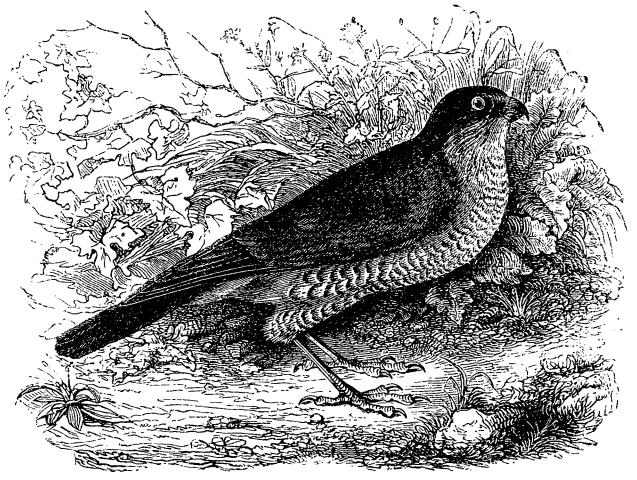
Other foreign species are as follows: the PIED GOSHAWK, *A. melanoleucus;* the RADIATED FALCON, *A. radiatus;* the ONE-BANDED HAWK, *A. unicinctus;* the NEW HOLLAND WHITE EAGLE, *A. Novæ Hollandiæ;* the THREE-STREAK HAWK, *A. trivirgatus;* the PLUMBEOUS FALCON, *A. nitidus;* the GRAY-BELLIED FALCON, *A. poliogaster;* the SPOTTED FALCON, *A. leucorrhous;* and the GREAT-BILLED FALCON, *A. magnirostris.*

The AMERICAN GOSHAWK—the BLACK-CAP HAWK of Wilson—*A. atricapillus*, which has been erroneously regarded as identical with the common goshawk of Europe, greatly resembles that bird, however, but it is of a lighter color, and the bands are narrower and more numerous. It is sparsely distributed in Northern and Eastern North America.

Genus ACCIPITER: *Accipiter.*—This term, from the Latin, signifying *Hawk*, was used by Linnæus as the title of the order which we call *Raptores;* as the name of a genus, we here apply it to the species of small hawks of which the EUROPEAN SPARROW-HAWK—the *Epervier* of the French—*A. nisus*, is the type. This bird, which is to be distinguished from the *American Sparrow-Hawk*, noticed under the genus *Falcon*, resembles that bird, being about twelve inches in length; dark brown above, reddish below, with numerous cross-bands of dark brown. It haunts wooded districts, and devours large numbers of small birds and small quadrupeds; it is also a great depredator among the chickens of the poultry-yard. It was formerly used in falconry, especially for the hunting of land-rails. It frequently makes use of old nests, especially those of the crow, where it lays four or five eggs of a pale bluish-white, blotched and spotted with dark brown. It is common in Europe and Asia.

Other foreign species are the DWARF FALCON, *A. minullus*, ash-colored above, and white banded with brown below; not larger than our robin, but exceedingly courageous, and contending successfully against crows and shrikes—found in Africa: the TINY FALCON, *A. tinus;* the STREAKED HAWK, *A. virgatus;* the RED-THIGHED SPARROW-HAWK, *A. erythronemia;* the SPECKLED SPAR-

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THE EUROPEAN SPARROW-HAWK.

ROW-HAWK, *A. tachiro;* the RED-BELLIED HAWK, *A. rufiventris;* the HOODED HAWK, *A. pileatus;* the MADAGASCAR HAWK, *A. Madagascariensis;* the NEW HOLLAND SPARROW-HAWK, *A. cirrocephalus;* and the AUSTRALIAN GOSHAWK, *A. approximans.*

The American species are as follows: the AMERICAN BROWN HAWK, or SHARP-SHINNED HAWK, or CHICKEN-HAWK, *A. fuscus*, twelve to fourteen inches long; very common throughout North America: COOPER'S HAWK, *A. Cooperii*, eighteen to twenty inches long; dark ashy-brown above, but subject to great varieties of color; found all over the United States: and the MEXICAN BLACK-CAPPED HAWK, *A. Mexicanus*, fifteen to seventeen inches long; dark brownish-black above, beneath light rufous; common in Mexico.

Genus POLIORNIS: *Poliornis.*—Under this genus the British Museum Catalogue presents the following species: the TEESA HAWK, *P. Teesa;* the PALE HAWK, *P. liventer;* the GRAY-CHEEKED HAWK, *P. Indicus;* and the DARK-CHEEKED HAWK, *P. pyrrhogenys.*

Genus GERANOSPIZA: *Geranospiza*, according to the same authority, includes the SLENDER HAWK, *G. gracilis.*

Genus MICRASTUR: *Micrastur*, also, according to the preceding authority, includes the PIED SPARROW-HAWK, *M. brachypterus;* the YELLOW-NECKED HAWK, *M. xanthothorax;* and the CONCENTRICAL SPARROW-HAWK, *M. concentricus.*

Genus MICRONISUS: *Micronisus*, according to the same authority, includes the SOOLO FALCON, *M. Soloensis;* FRANCE'S SPARROW-HAWK, *M. Francesii;* BROWN'S HAWK, *M. badius;* the SHORT-TOED SPARROW-HAWK, *M. sphenurus;* the RED-LEGGED FALCON, *M. Gabar;* the SINGLE-STREAKED HAWK, *M. monogrammicus.*

Genus MELIERAX: *Melierax.*—This includes the CHANTING HAWK, *M. musicus*, found in Africa; it is ash-colored above and white, rayed with brown, beneath; lives on rabbits, rats, moles, mice, quails, and partridges, and makes its nests on trees. The sexes pair for life; during incubation the male turns musician, and sings by day and night. Each strain occupies about a minute, when he pauses for a time and then begins again. He is so absorbed while singing that he may be approached, though at other times exceedingly shy. Levaillant having killed a male bird, the female searched for him on all sides, uttering piteous cries; in another case, having killed a female, the husband mounted to the tops of the trees and poured out a mingled strain of lamentation and defiance.

Genus CYMINDIS: *Cymindis.*—This includes two species, the CAYENNE FALCON, *C. Cayennensis*, and the CROOK-BILLED FALCON, *C. uncinatus*, both of South America, and both resembling the buzzards.

Genus CIRCAETUS: *Circaetus.*—This includes several species intermediate between the buzzards and eagles. The JEAN-LE-BLANC EAGLE, *C. Gallicus*, is common over all Europe; its wings

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THE HARPY EAGLE.

resemble those of the eagle; the bill, however, is more sharply hooked, and the talons are shorter. It is brown above and white beneath, spotted with pale brown. It feeds on lizards, frogs, and serpents, but also carries off hens, ducks, and young turkeys. Buffon raised one of this species, which was rather amiable in its manners, but would never drink when under observation, though it drank freely when it had cautiously looked about, and became satisfied that it was alone. The reason of this seemed to be that in drinking it plunged its head entirely in the water, and therefore took care not to be surprised, by first assuring itself that no enemy was near.

The CROWNED EAGLE, *C. coronatus*, is of Brazil, and is said to be the only bird that ventures to feed on skunks. It devours the armadillos, breaking their shells by carrying them high in air and letting them fall upon the earth. In default of fresh meat—flesh or fowl—it dines heartily on carrion.

Other species are the BLACK-BREASTED EAGLE, *C. thoracicus;* the BANDED FALCON, *C. fasciolatus;* the BACHA EAGLE, *C. Bacha;* the SPOTTED BACHA, *C. holospilus;* and the CHEELA EAGLE, *C. Cheela.*

Genus MORPHNUS: *Morphnus*, includes several species, called EAGLE-HAWKS, mostly American. HARRIS'S BUZZARD, *M. unicinctus*, is twenty-two to twenty-four inches long; the legs are long, the wings short, the tail long, the feet robust; the shoulders and thighs are red; the tail white at its base and tipped with white; the other upper parts deep umber brown; beneath, light brown. It is slow and heavy in its flight, and sluggish in its habits. It is rare in the Middle States, but common at the South; in Texas and Mexico abundant.

The South American species are the GUIANA GOSHAWK, *M. Guianensis;* and the RUFOUS-HEADED FALCON, *M. meridionalis.* The *M. occipitalis* and *M. albescens* are African species.

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THE HARPY EAGLE.

Genus NEOPUS: *Neopus*, includes the MALAY EAGLE, *N. Malayensis*, of a dull brown color, and feeding on reptiles, birds, and insects. It is common in the Malay peninsula and the vicinity.

Genus SPIZAETUS: *Spizaetus.*—These birds resemble the eagle-hawks; the *S. urubitinga* is found in Guiana and Brazil; it is twenty-five inches long, and lives in mountainous districts, and devours small quadrupeds, wounded birds, and fish. It is easily domesticated so far as to come to its cage to be fed, after having made its tour in the forests.

The CRESTED SPIZAETUS or GOSHAWK, *S. cristatus* or *S. ornatus*, greatly resembles the harpy eagle, but is of smaller size. Under this genus the British Museum Catalogue includes also the following: the MARTIAL EAGLE, *S. bellicosus;* the OCCIPITAL EAGLE, *S. occipitalis;* the TYRANT EAGLE, *S. tyrannus;* the CRESTED INDIAN EAGLE, *S. cirrhatus;* the CRESTED BORNEAN EAGLE, *S. Borneonensis;* and the BLACK and WHITE EAGLE, *C. melanoleucus.*

Genus HARPYIA: *Harpyia.*—This includes a single species, the HARPY EAGLE—the *Aigle déstructeur* of Sonnini; *A. coronada* of the Spanish of South America—*H. thrasaetus.* It is of the size, power, and fierceness of the true eagles. It has a crest of numerous broad, black feathers on the back part of the head, which is raised by excitement and depressed in tranquillity. The back and wings are brownish-black, each feather terminating in a narrow streak of lighter shade; the under surface is pure white; its wings are short, its legs and talons robust, its general aspect severe and savage, with something of the gloomy expression of the owl. It inhabits Mexico and the northern portions of South America. It preys on sloths, monkeys, fawns, and other quadrupeds, and especially the young ones. One of the species, which was being carried to England, killed and devoured a king-vulture which was in the same cage. After its arrival a cat was put into its cage, upon which it struck it with his foot and instantly broke its back. It has been known to break a man's skull by a stroke of its powerful bill. M. D'Orbigny tells of one which,

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THE EAGLE MASTERED.

having been pierced entirely through the body by two arrows of the Indians, still fiercely attacked the persons around him, and was finally dispatched with difficulty. This formidable species inhabits the edges of forests, and is particularly fond of seeking its prey along the banks of rivers; it seems not to fear man, but allows his approach with an air of defiance.

Genus EAGLE: *Aquila.*—This includes the true eagles, of which there are about twenty species, and which may be considered the kings among birds, as are the lions among quadrupeds. Inferior, perhaps, to the true falcons in courage and enterprise, they are still the most powerful and formidable of the feathered tribes. Every thing in their formation and constitution is admirably fitted to maintain this master position which they hold among their class. The bill is strongly hooked, and very acute at the tip; the wings are long, and usually pointed, with the third, fourth, and fifth quills longest; the tail is long, broad, and rounded; the toes are long and powerful; the talons are strong, curved, and acute. They feed not only on such birds and quadrupeds as are the prey of the larger falcons, but upon fawns, lambs, and pigs. They have been known to carry off dogs and foxes, and well-authenticated accounts of their bearing off young children are furnished. In general, they are their own hunters and butchers, but some of the species feed readily on carrion, driving off the vultures and robbing them of their legitimate feast. They generally strike their prey upon the ground, and the stoop is almost instantly fatal to any animal on which they pounce. The mere fall of a body of fifteen or eighteen pounds in

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weight, from an elevation of fifteen hundred or two thousand feet, would be powerful; but the eagle shoots down with a great initial velocity, and as she delivers the whole of her momentum with the claw, she not only dashes the animal to the earth, but plunges the claw into its body up to the toe, dislocating the spine or breaking the skull of the feebler quadrupeds, and therefore usually inflicting instant death.

Stern and unsocial in their character, yet confident in their strength and efficient means of defense, the eagles delight to dwell in the solitude of inaccessible rocks, on whose summits they build their rude nest and sit in lone majesty, while with their keen and piercing eye they sweep the plains below, even to the horizon. The combined extent and minuteness of their vision, often including not merely towns, villages, and districts, but countries and even kingdoms in its vast circuit, at the same time carefully piercing the depths of forests, the mazes of swamps, and the intricacies of lawns and meadows, so as to discover every moving object—even the sly and stealthy animals that constitute their prey—form a power of sight to which human experience makes no approach. If we connect with this amazing gift of vision the power of flight which enables these birds to shoot through the heavens so as to pass from one zone to another in a single day and at a single flight, we shall readily comprehend how it is that they have in all ages so impressed the popular imagination as to render them the standing types and emblems of power.

In ancient times the lion was the representative of kings, but the eagle, soaring in the sky, was made the companion of the gods, and the constant associate of Jupiter himself. In ignorance of the true qualities of these animals, courage and magnanimity, daring and dignity, were regarded as their attributes, and thus they were deemed fitting representatives of the noblest and most exalted of both gods and men. We now know that both the eagle and the lion are butchers, gluttons, and cowards, but such is our inherent admiration of power, that, inasmuch as they are the most destructive of animals, their names are still associated in our minds with something of respect and admiration. The ass is meek, patient, useful, intelligent, but his name, applied to a man, is the most insulting of epithets; the goose is gentle, inoffensive, and one of the very wisest of the feathered creation, but it furnishes the popular mind and tongue with a term significant of something bordering on idiocy. Who so base as not to spurn these degrading terms? Who so sage as not to be flattered by the title of lion or eagle?

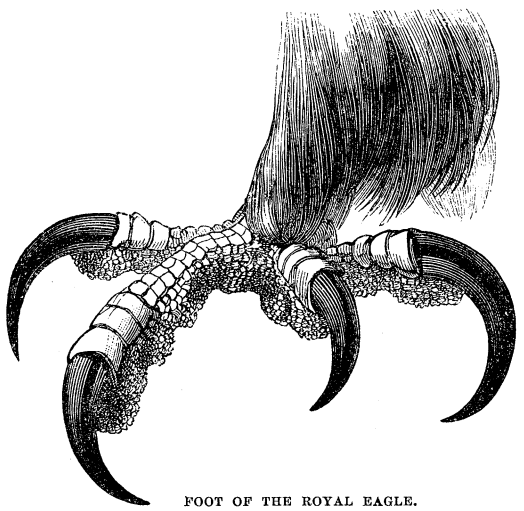
And after all something may be said in mitigation of even the general charge of destructiveness brought against these prominent members of the carnivorous tribes. The common idea is, "that they are constantly engaged in the work of death and destruction; that the lion in the desert is forever roaring and rending; and that the mountain air can never rest for the wing of the eagle; that her shadow is a constant ensign of dread, and her cry a never-ceasing sound of fear. This is the general notion, but nothing can be wider from the fact, and nothing would be more in opposition to the whole tenor of nature's economy. It is the small powers and the feeble exertions in nature that are never at rest. Those creeping currents of air which we can hardly call breezes, and which tell only upon the leaves of the aspen, are never at rest; but storms are not frequent, and a hurricane, even in what may be called hurricane countries, is an event of comparatively rare occurrence. And it is so among birds. The gentle sparrow is always catching caterpillars, and devours fifty in a day, while the golden eagle does not feed once a day—nay, on the average not oftener than once a week. Even when eagles are on the hunt, they do not occasion much general alarm to those animals upon which they prey. The eagle, when towering in her pride of place, certainly commands in vision, and can command in power of destruction, a very wide horizon; but still her command, even at this time, is one of peace and general safety; and as hawks and buzzards and harriers, which are really far more destructive than eagles, are not very fond of beating the bushes if there is an eagle above them in the sky, it is doubtful whether, upon the whole, the golden eagle may not partake more of the character of a preserver than of that of a destroyer. Even when she has singled out her prey, and is about to stoop at it, the fluttering wings, as she winds herself up to the bent of her power, and the loud note with which she begins her descent, all tend to warn the rest of the animals, so that they lie close; the eagle devours the prey in silence, and she does not stoop again on the same ground during the same day."

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THE ROYAL EAGLE.

The Royal Eagle or Golden Eagle, *A. chrysaetos* or *A. fulvus*, the Common Eagle of Europe, may be taken as the type of the genus: it is mostly of an obscure, blackish-brown color, the head and neck being of a golden red, from which it is named; the tail is deep gray, regularly barred, and terminated with blackish-brown; beak fawn color, iris brown, cere and feet yellow; the length thirty-five to forty inches. It lays two to three eggs, of a dirty white, with reddish blotches; the nest is made on the shelving rocks of inaccessible mountain peaks, never upon trees; this is wide and flat, and rudely made of sticks and brambles, without lining. There is a variety totally white; this is the *Falco albus* of Gmelin, or the *White Eagle* of Brisson. The *Ring-tailed Eagle*, long supposed to be a distinct species, is now known to be a young Golden Eagle.



FOOT OF THE ROYAL EAGLE.

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This monarch of the mountain forests, over which he has reigned since the creation, is still found exercising his dominion in the ancient and remote woods of Europe, Asia, and America, but more particularly in the northern parts. Nuttall thus describes it: "Near their rocky nests they are seen usually in pairs, at times majestically soaring to a vast height, and gazing on the sun, toward which they ascend until they disappear from view. From this sublime elevation they often select their devoted prey—sometimes a kid or a lamb from the sporting flock, or the timid rabbit or hare crouched in the furrow, or sheltered in some bush. The largest birds are also frequently their victims, and in extreme want they will not refuse to join with the alarmed vulture in his cadaverous repast. After this gorging meal the eagle can, if necessary, fast for several days. The precarious nature of his subsistence, and the violence by which it is constantly obtained, seem to produce a moral effect on the disposition of this rapacious bird; though in pairs, they are never seen associated with their young; their offspring are driven forth to lead the same unsocial, wandering life as their unfeeling progenitors. This harsh and tyrannical disposition is strongly displayed even when they lead a life of restraint and confinement. The weaker bird is never willingly suffered to eat a morsel, and though he may cower and quail under the blow with the most abject submission, the same savage deportment continues toward him as long as he exists. Those which I have seen in confinement frequently uttered hoarse and stridulous cries, sometimes almost barkings, accompanied by vaporous breathings, strongly expressive of their ardent, unconquerable, and savage appetites. Their fire-darting eyes, lowering brows, flat foreheads, restless disposition, and terrific plaints, together with their powerful natural weapons, seem to assimilate them to the tiger rather than the timorous bird. Yet it would appear that they may be rendered docile, as the Tartars, according to Marco Polo, in 1269, were said to tame this species to the chase of hares, foxes, wolves, antilopes, and other kinds of large game, in which it displayed all the docility of the falcon.

"The longevity of the eagle is as remarkable as its strength; it is believed to subsist for a century, and is about three years in gaining its complete growth and fixed plumage. This bird was held in high estimation by the ancients on account of its extraordinary magnitude, courage, and sanguinary habits. The Romans chose it as an emblem for their imperial standard, and from its aspiring flight and majestic soaring it was fabled to hold communion with heaven, and to be the favorite messenger of Jove. The Tartars have a particular esteem for the feathers of the tail, with which they superstitiously think to plume invincible arrows. It is no less the venerated war-eagle of our northern and western aborigines, and the caudal feathers are extremely valued for talismanic head-dresses, and as sacred decorations for the pipe of peace."

The Imperial Eagle, *A. imperialis* or *A. heliaca* or *A. mogilnik*, was long confounded with the golden eagle; it inhabits the mountain forests of Southern Europe and Northern Africa. The head, which has a light crest, is of a slaty-gray color; the upper parts nearly black, the feathers terminating in lighter shades; under surface, from the breast, white.

Other species are Bonelli's Eagle, *A. fasciata*, or *A. Bonellii*, inhabiting Southern Europe; the Rough-footed Eagle, or Little Eagle, or Spotted Eagle, or Crying Eagle, *A. nævia*, or *A. maculata*, found in the mountain forests of the north, east, and south of Europe, and uttering a continual plaintive cry, from which one of its popular names is derived; the Booted Eagle, *A. pennata*, the smallest of European Eagles, being only eighteen inches long, found in the south of Europe; Gifford's Eagle, *A. armigera*, or *A. bellicosa*, an African species, equal to the Golden Eagle in size; the Tawny Eagle, *A. nævioides*, the Bold Eagle, *A. audax*, Reinwardt's Eagle, *A. Malayensis;* the Vulturine Eagle or Caffre Eagle, *A. vulturina*, of the size of the largest eagles, and approaching the vultures in its form and habits.

Genus HALIAETUS: *Haliaetus*; this term, signifying Sea Eagle, includes several species called *Fishing Eagles*, at the head of which may be placed the species most familiar in this country, the Bald Eagle, or White-headed Eagle, *H. leucocephalus*. It is thirty-five to forty inches in length; the head above and behind, with the neck, is sometimes white, whence, from its appearance, the term of *bald* is given to the species; often, however, these parts are light brownish-fulvous, varying, however, in shade, in different specimens; the tail pure white; other parts rich purplish brown. The variations of its color, in different stages of growth, caused

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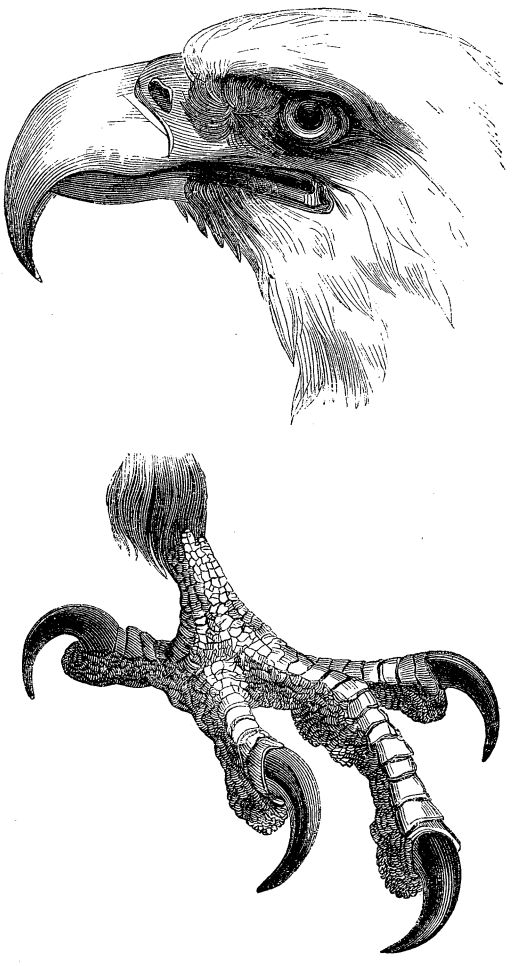
THE BALD EAGLE.

it to be long confounded with the Great Sea Eagle. It is found along the sea-coasts, lakes, and rivers throughout the Arctic circle, and is met with in the northern parts of Europe, Asia, and America. It is common in the United States, and breeds along the borders of the ocean, usually making its nest in a secluded situation, on some lofty pine or cypress; this is composed of large sticks, four or five feet in length, forming a foundation, on which is laid a covering of sods, hay, moss, weeds, pine tops, and other coarse materials, all forming a pile five or six feet high, and four or five in breadth. On this almost hard bed, eggs are laid, usually at long intervals, so that the young are hatched at different periods. Here the young are sedulously fed, principally on fish; they continue to resort to the nest as their home and refuge, long after they are able to fly and provide for themselves. It is common for the old birds to breed year after year, in the same haunts.

The pugnacious habits of this bold and powerful bird, have excited the admiration, and stimulated the descriptive powers of many naturalists; but Wilson, in a celebrated passage, has surpassed all others, and excited in the reader emotions of sublimity rivaling those of the actual beholder. "This distinguished bird," says he, "is the most beautiful of his tribe in this part of the world, and the adopted emblem of our country; it is therefore entitled to particular notice. The celebrated Cataract of Niagara is a noted place of resort for these birds, as well on account of the fish procured there, as for the numerous carcasses of squirrels, deer, bears, and various other animals, that, in their attempts to cross the river above the Falls, have been dragged into the

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current, and precipitated down that tremendous gulf, where, among the rocks that bound the rapids below, they furnish a rich repast for the vulture, the raven, and bald eagle, the subject of the present account. Formed by nature for braving the severest cold; feeding equally on the produce of the sea and of the land; possessing powers of flight capable of outstripping even the tempests themselves; unawed by any thing but man; and, from the ethereal heights to which he soars, looking abroad, at one glance, on an immeasurable expanse of forests, fields, lakes, and ocean, deep below him, he appears indifferent to localities and to change of seasons; as, in a few minutes, he can pass from summer to winter, from the lower to the higher regions of the atmosphere, the abode of eternal cold, and thence descend, at will, to the torrid, or the arctic regions of the earth. He is, therefore, found at all seasons in the countries he inhabits; but prefers such places as have been mentioned above, from the great partiality he has for fish.



HEAD AND FOOT OF BALD EAGLE.

"In procuring these, he displays, in a very singular manner, the genius and energy of his character, which is fierce, contemplative, daring, and tyrannical—attributes not exerted but on particular occasions, but, when put forth, overpowering all opposition. Elevated on the high dead limb of some gigantic tree that commands a wide view of the neighboring shore and ocean, he seems calmly to contemplate the motions of the various feathered tribes that pursue their busy avocations below—the snow-white gulls slowly winnowing the air; the busy *tringæ* coursing along the sands; trains of ducks streaming over the surface; silent and watchful cranes, intent and wading; clamorous crows; and all the winged multitudes that subsist by the bounty of this vast liquid magazine of nature. High over all these hovers one, whose action instantly arrests his whole attention. By his wide curvature of wing, and sudden suspension in air, he knows him to be the fish-hawk, settling over some devoted victim of the deep. His eye kindles at the sight, and balancing himself, with half-opened wings, on the branch, he watches the result. Down, rapid as an arrow from heaven, descends the distant object of his attention, the roar of its wings reaching the ear as it disappears in the deep, making the surges foam around. At this moment, the eager looks of the eagle are all ardor; and leveling his neck for flight, he sees the fish-hawk once more emerge, struggling with his prey, and mounting in the air with screams of exultation. These are the signal for our hero, who, launching into the air, instantly gives chase, and soon gains on the fish-hawk; each exerts his utmost to mount above the other, displaying in these rencontres the most elegant and sublime aerial evolutions. The unencumbered eagle rapidly advances, and is just on the point of reaching his opponent, when, with a sudden scream, probably of despair and honest execration, the latter drops his fish; the eagle, poising himself for a moment, as if to take a more certain aim, descends like a whirlwind, snatches it in his grasp ere it reaches the water, and bears his ill-gotten booty silently away to the woods.

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"These predatory attacks and defensive maneuvers of the eagle and the fish-hawk, are matters of daily observation along the whole of our sea-board, from Georgia to New England, and frequently excite great interest in the spectators. Sympathy, however, on this, as on most other occasions, generally sides with the honest and laborious sufferer, in opposition to the attack of power, injustice, and rapacity—qualities for which our hero is so generally notorious, and which, in his superior, *man*, are certainly detestable. As for the feelings of the poor fish, they seem altogether out of the question.

"When driven, as he sometimes is, by the combined courage and perseverance of the fish-hawks, from their neighborhood, and forced to hunt for himself, he retires more inland, in search of young pigs, of which he destroys great numbers. In the lower parts of Virginia and North Carolina, where the inhabitants raise vast herds of these animals, complaints of this kind are very general against him. He also de troys young lambs in the early part of spring; and will sometimes attack old sickly sheep, aiming furiously at their eyes."

Mr. J. L. Gardiner, addressing Wilson, writes thus:—"The bald eagles remain on Long Island during the whole winter. They can be most easily discovered on evenings, by their loud snoring while asleep on high oak-trees; and, when awake, their hearing seems to be nearly as good as their sight. I think I mentioned to you, that I had myself seen one flying with a lamb ten days old, and which it dropped on the ground from about ten or twelve feet high. The struggling of the lamb, more than its weight, prevented its carrying it away. My running, hallooing, and being very nigh, might prevent its completing its design. It had broken the back in the act of seizing it; and I was under the necessity of killing it outright to prevent its misery. The lamb's dam seemed astonished to see its innocent offspring borne off into the air by a bird.

"I was lately told by a man of truth, that he saw an eagle rob a hawk of its fish, and the hawk seemed so enraged as to fly down at the eagle, while the eagle very deliberately, in the air, threw himself partly over on his back, and, while he grasped with one foot the fish, extended the other to threaten or seize the hawk. I have known several hawks unite to attack the eagle; but never knew a single one to do it. The eagle seems to regard the hawks as the hawks do the kingbirds—only as teasing, troublesome fellows."

"The intrepidity of character, mentioned above," continues Wilson, "may be further illustrated by the following fact, which occurred a few years ago, near Great Egg Harbor, New Jersey:—A woman, who happened to be weeding in the garden, had set her child down near, to amuse itself while she was at work: when a sudden and extraordinary rushing sound, and a scream from her child, alarmed her, and, starting up, she beheld the infant thrown down, and dragged some few feet, and a large bald eagle bearing off a fragment of its frock, which being the only part seized, and giving way, providentially saved the life of the infant.

"The appetite of the bald eagle, though habituated to long fasting, is of the most voracious, and often the most indelicate kind. Fish, when he can obtain them, are preferred to all other fare. Young lambs and pigs are dainty morsels, and made free with on all favorable occasions. Ducks, geese, gulls, and other sea-fowl, are also seized with avidity. The most putrid carrion, when nothing better can be had, is acceptable; and the collected groups of gormandizing vultures, on the approach of this dignified personage, instantly disperse, and make way for their master, waiting his departure in sullen silence, and at a respectful distance, on the adjacent trees.

"In one of those partial migrations of tree-squirrels that sometimes take place in our western forests, many thousands of them were drowned in attempting to cross the Ohio; and at a certain place, not far from Wheeling, a prodigious number of their dead bodies were floated to the shore by an eddy. Here the vultures assembled in great force, and had regaled themselves for some time, when a bald eagle made his appearance, and took sole possession of the premises, keeping the whole vultures at their proper distance for several days. He has also been seen navigating the same river on a floating carrion, though scarcely raised above the surface of the water, and tugging at the carcass, regardless of snags, sawyers, planters, or shallows. He sometimes carries his tyranny to great extremes against the vultures. In hard times, when feed happens to be scarce, should he accidentally meet with one of these which has its craw crammed with carrion, he

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attacks it fiercely in the air; the cowardly vulture instantly disgorges. and the delicious contents are snatched up by the eagle before they reach the ground.

"The flight of the bald eagle, when taken into consideration with the ardor and energy of his character, is noble and interesting. Sometimes the human eye can just discern him, like a minute speck, moving in slow curvatures along the face of the heavens, as if reconnoitering the earth at that immense distance. Sometimes he glides along in a direct horizontal line, at a vast height, with expanded and unmoving wings, till he gradually disappears in the distant blue ether. Seen gliding in easy circles over the high shores and mountainous cliffs that tower above the Hudson and Susquehanna, he attracts the eye of the intelligent voyager, and adds great interest to the scenery. At the great Cataract of Niagara, already mentioned, there rises from the gulf into which the Fall of the Horse-Shoe descends, a stupendous column of smoke, or spray, reaching to the heavens, and moving off in large black clouds, according to the direction of the wind, forming a very striking and majestic appearance. The eagles are here seen sailing about, sometimes losing themselves in this thick column, and again reappearing in another place, with such ease and elegance of motion, as renders the whole truly sublime.

"High o'er the watery uproar, silent seen,
Sailing sedate in majesty serene,
Now midst the pillared spray sublimely lost,
And now, emerging, down the rapids tossed,
Glides the Bald Eagle, gazing, calm and slow,
O'er all the horrors of the scene below;
Intent alone to sate himself with blood,
From the torn victims of the raging flood."

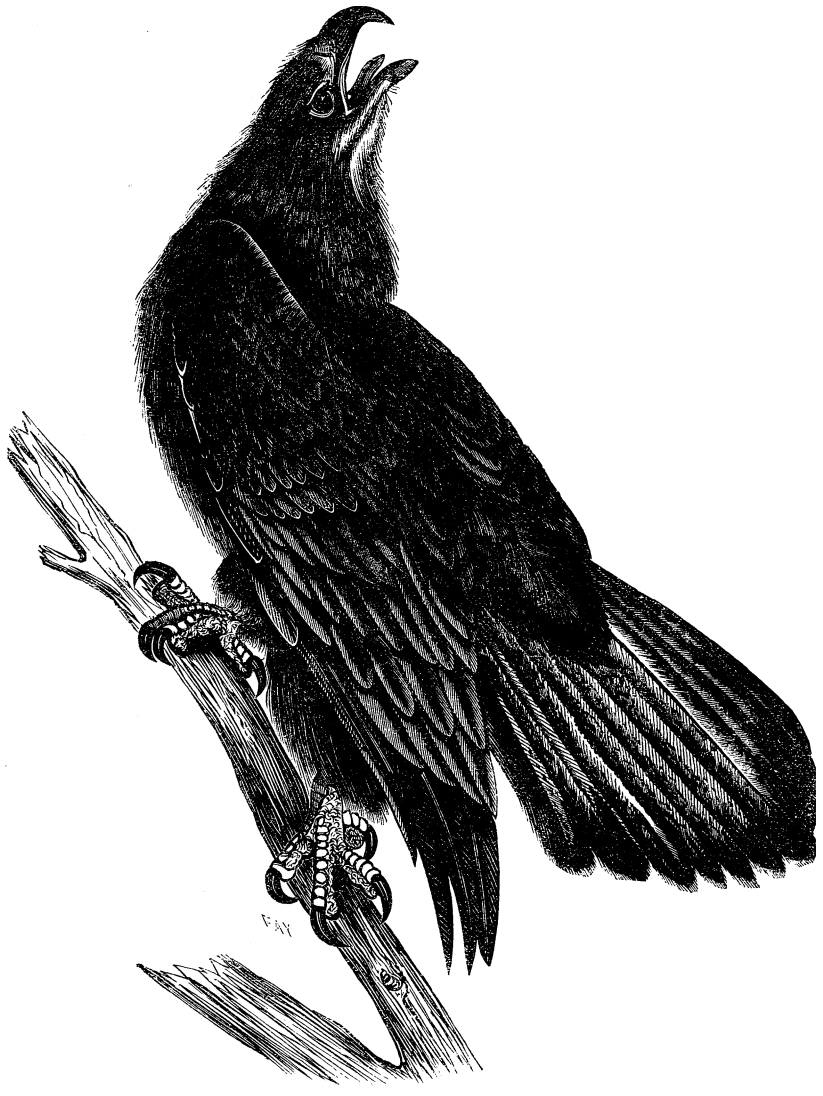
Audubon describes a bald eagle pursuing a swan, as follows:—"The next moment, however, the wild trumpet-like sound of a yet distant but approaching swan is heard: a shriek from the female eagle comes across the stream; for she is fully as alert as her mate. The snow-white bird is now in sight: her long neck is stretched forward; her eye is on the watch, vigilant as that of her enemy; her large wings seem with difficulty to support the weight of her body, although they flap incessantly. So irksome do her exertions seem, that her very legs are spread beneath her tail, to aid her in her flight. She approaches; the eagle has marked her for his prey. As the swan is passing the dreaded pair, the male bird starts from his perch, in full preparation for the chase, with an awful scream.

"Now is the time to witness a display of the eagle's powers. He glides through the air like a falling star, and, like a flash of lightning, comes upon the timorous quarry, which now, in agony and despair, seeks, by various maneuvers, to elude the grasp of his cruel talons. It mounts, doubles, and willingly would plunge into the stream, were it not prevented by the eagle, which, long possessed of the knowledge that, by such a stratagem, the swan might escape him, forces it to remain in the air, by attempting to strike it with his talons from beneath. The hope of escape is soon given up by the swan. It has already become much weakened, and its strength fails at the sight of the courage and swiftness of its antagonist. Its last gasp is about to escape, when the ferocious eagle strikes with his talons the under side of its wing, and, with unresisted power, forces the bird to fall in a slanting direction upon the nearest shore."

And, again, when two of these eagles are hunting, in concert, some bird which has alighted on the water, this writer says:

"At other times, when these eagles, sailing in search of prey, discover a goose, a duck, or a swan, that has alighted on the water, they accomplish its destruction in a manner that is worthy of our attention. Well aware that the water-fowl have it in their power to dive at their approach, and thereby elude their attempts upon them, they ascend in the air, in opposite directions, over the lake or river on which the object which they are desirous of possessing has been observed. Both reach a certain height, immediately after which, one of them glides with great swiftness toward the prey; the latter, meantime, aware of the eagle's intention, dives the moment before he reaches the spot. The pursuer then rises in the air, and is met by its mate, which glides toward the water bird, that has just emerged to breathe, and forces it to plunge again beneath

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THE YOUNG BALD EAGLE.

the surface, to escape the talons of this second assailant. The first eagle is now poising itself in the place where its mate formerly was, and rushes anew, to force the quarry to make another plunge. By thus alternately gliding, in rapid and often-repeated rushes, over the ill-fated bird, they soon fatigue it, when it stretches out its neck, swims deeply, and makes for the shore in the hope of concealing itself among the rank weeds. But this is of no avail; for the eagles follow it in all its motions; and the moment it approaches the margin, one of them darts upon it."

It cannot be very gratifying to us Americans, after reading these pages, to reflect that this bird is inscribed on our national banner: we have only the poor satisfaction to know that Franklin early uttered his protest against it. His words were as follows:—"For my part, I wish the bald eagle had not been chosen as the representative of our country. He is a bird of bad moral character; he does not get his living honestly. You may have seen him perched on some dead tree, where, too lazy to fish for himself, he watches the labors of the fishing-hawk; and when that diligent bird has at length taken a fish, and is bearing it to his nest for the support of his mate and young ones, the bald eagle pursues him and takes it from him. With all this injustice, he is never in

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good case, but, like those among men who live by sharping and robbing, he is generally poor, and often very lousy. Besides, he is a rank coward: the little kingbird, not bigger than a sparrow, attacks him boldly, and drives him out of the district. He is therefore by no means a proper emblem for the brave and honest Cincinnati of America, who have driven all the Kingbirds from our country; though exactly fit for that order of knights which the French call *Chevaliers d'Industrie*." We can, indeed, account for the taste which led to this choice, for the descendants of those who cherish the lion as their emblem, might naturally select the eagle as theirs. This, however, is only an explanation, not an excuse. Perhaps our legislators who chose the eagle were rather puzzled, for we are told that among the various devices suggested at the time of the discussion upon the subject in Congress, were the shad, the hog, and the turkey. It appears, therefore, that all things considered, in taking the eagle, which is only detestable, we escaped something ridiculous, and therefore, as the world goes, may thank heaven that it is no worse.

The WASHINGTON SEA EAGLE; *Falco Washingtonii*.—This bird is about forty inches in length, and was discovered by Audubon in Kentucky, in 1814, and is described by him as disdaining the piratical habits of the bald eagle, and as flying closer to the earth, and in wider circles. Cassin says, on this subject, that he considers Audubon's description as referring to the young bird, and the adult as yet unknown. He adds, "No specimen precisely corresponding with Mr. Audubon's bird, has been obtained since its discovery, and it has latterly been looked upon by naturalists, especially in Europe, as an unusually large specimen of the young white-headed eagle." The engraving of a bird of this kind, on the preceding page, suggests the probable accuracy of this opinion.

The GREAT SEA-EAGLE, or GRAY EAGLE, or CINEREOUS EAGLE, *H. albicilla*—the *Orfraie* of Buffon; the *Falco ossifragus* of Gmelin—is common in Europe and the high northern parts of North America. Its color is an ashy-gray, lighter on the head and neck; the tail a pure white; the bill a pale yellow; the iris a brilliant yellow. Its flight is less elevated than most other eagles; it feeds on fish, sea-birds, seals, and also on quadrupeds, and hunts by night as well as by day, both on sea and land. It robs other fishing-birds inferior to itself of their prey. Such is its voracity that it sometimes buries its talons in a seal bigger than itself, and, unable to withdraw them, is plunged in the sea and drowned. The Greenlanders eat its flesh, and make amulets of its bills and claws. This species is not found in the United States, and appears only to exist on this continent very sparsely in the arctic regions.

The BLACK AND WHITE EAGLE, *H. aguia*, is a South American species, thought by the inhabitants to be a hygrometer; when it is seen to circle high in the air, and heard to utter a scream, it is regarded as monitory and a sure presage of a storm.

The PISCIVOROUS EAGLE, *H. vocifer*, and BLAGRUS EAGLE, *H. blagrus*, are African species, living along the borders of the sea, and feeding chiefly on fish; the GARUDA EAGLE or PONDICHERRY EAGLE, *H. Garuda*, or *H. Ponticerianus*, or *H. Indus*, is found in India. The latter, called *Little East India Eagle* by Buffon, is consecrated to Vishnu by the Brahmins.

Genus CUNCUMA: *Cuncuma*.—This, according to the Catalogue of the British Museum, embraces MACE'S EAGLE, *C. Macei;* the WHITE-BELLIED EAGLE, *C. leucogaster;* the BLACK AND WHITE EAGLE, *C. melanoleucus*. These species resemble those of the preceding genus.

Genus HALIASTUR: *Haliastur*.—According to the British Museum Catalogue, the following belong to this genus: the WHITE-HEADED RUFOUS EAGLE, *H. leucosternus*, and the WHISTLING HAWK, *H. sphenurus*.

Genus HELOTARSUS: *Helotarsus*, includes the BUFFOON EAGLE or SHORT-TAILED EAGLE, *H. ecaudatus*, a small species of South Africa; the plumage is black tinged with red; the tail is of a bright red; the bill black; in flying it has the appearance of a bird with the tail cut off. Levaillant gave it its name from its habit of tumbling like a buffoon in the air.

Genus GAMPSONYX: *Gampsonyx*.—Under this the British Museum Catalogue arranges the FALCON-LIKE HAWK, *G. Swainsoni*.

Genus ROSTRHAMUS: *Rostrhamus*.—This includes a single species, the FISH-HOOK EAGLE, *R. hamatus*, so named from the shape of the upper mandible, which bends down in the form of a fish-hook. Its plumage is black, and its length seventeen inches. It is found in South America.

Genus GYPOHIERAX: *Gypohierax*.—This term, signifying VULTURE-HAWK, is descriptive

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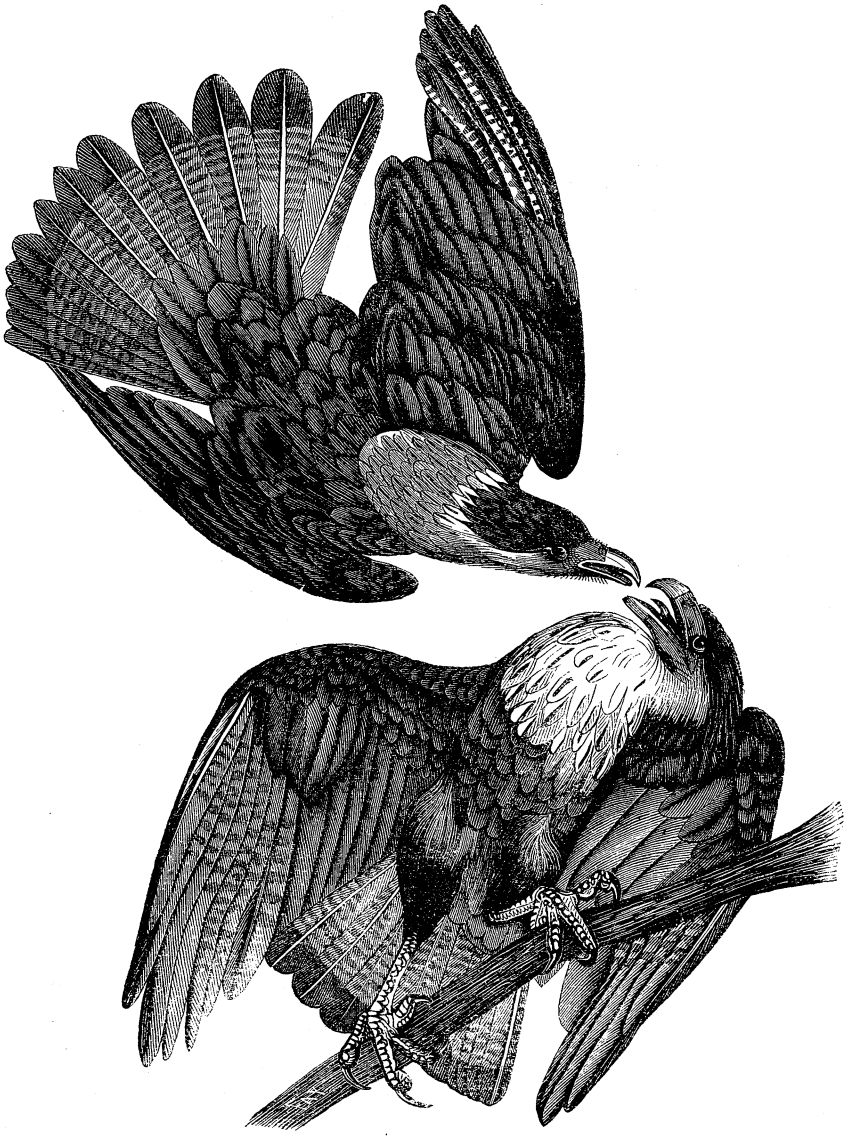


THE VULTURE HAWK.

of the only species belonging to the genus—*G. angolensis* of Gray; the *Vultur angolensis* of Latham. It is of the size of the goose, the general plumage being white; the middle part of the wings and back black; the bill and tarsi white; the lower part of the neck enlarged into a sack. It is found in Western Africa, and especially at Angola, and may be properly designated the *Angola Vulture-Hawk.*

Genus CARACARA: *Caracara.*—Under this title we shall include several species, arranged by some naturalists in several different genera, and all partaking somewhat of the vulturine character. They have the general aspect of the hawks or eagles, and carry off their prey in their talons in the manner of those birds, but their habits resemble those of the vultures. Hence they are regarded as a distinct tribe by Le Maout and some others. The prominent species is the CARACARA EAGLE—the *Polyborus Braziliensis* of Vieillot; the *Falco Braziliensis* of Latham; *Polyborus vulgaris* of Audubon; *P. tharus* of Molina. The length of this bird is twenty-four to twenty-six inches; the wings and tail are long; there is a bare place on the breast as in the turkey-buzzard; the back and wings are brown, edged with umber-color; tail grayish-white, banded with brown; neck light brownish-yellow; the fore parts of the body, above and below, banded with brown and white; the hind part, abdomen, and sides, dark brown. This is the most common of the Falconidæ found in Brazil and the vicinity; it extends northward to Mexico, and is sometimes met with in the Southern and Southwestern States. Its name of *Caracara* is derived from its love-cry, which it utters while turning its head upon its back; it is omnivorous, though it prefers small reptiles, and often walks in the water, seizing upon frogs, young alligators, and the like; it then drags them to the shore and devours them. It is a lazy bird, and therefore, in the vicinity of human settlements, feeds upon the offal it can pick up; it often follows travelers, and though carefully keeping itself concealed in the forests, still waits and watches over their encampments at night, and upon their departure, descends and feasts on the relics of food they may have left. It is usually seen in flocks during the day, but at night they divide in pairs and resume their conjugal avocations. It is very quarrelsome with its kindred, two of them often fighting furiously for the same piece of food; they also rob other birds, and especially gulls, of their prey; but they are still cowardly, and submit to be sadly harassed by birds so insignificant as fly-catchers.

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THE CARACARA EAGLE.

The CHIMANGO CARACARA, *Poliborus Chimango*, inhabits the same country as the preceding, but is much more rare; it is also smaller, being thirteen to fifteen inches long.

The CHIMACHIMA CARACARA, *P. Chimachima*, is fifteen inches long, and is of a dirty yellow above; lives wholly on dead animal matter, and is found only in tropical America. Other species are the LONG-WINGED CARACARA, *C. megalopterus*, and the SOUTHERN CARACARA, *C. australis*.

Genus IBYCTER: *Ibycter*.—This term signifies *trumpeter*, in allusion to the deafening cry of the only species, the RED-THROATED FALCON or WHITE-BELLIED IBYCTER, *I. leucogaster*; the *Falco aquilinus* of Gmelin: it is sixteen inches long, and is called *Captain of the Big-bills* by the natives, because some of its habits resemble those of the toucans. It is of a blue-black above, the belly and rump of a pure white. It is found in flocks in the forests of Guiana and Brazil.

Genus DAPTRIUS: *Daptrius*, includes a single species, the BLACK CARACARA, *D. ater*, or *Falco aterinus* of Temminck. Its length is fourteen or fifteen inches, and it is a native of Guiana and Brazil. This species is included in the genus Ibycter in the Catalogue of the British Museum, under the name of *I. ater*.

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THE LAMMERGEYER.

THE VULTURIDÆ.

In noticing the numerous family of Falconidæ, we began with the True Falcons, and thence proceeded through the various species of Hawks, Goshawks, Kites, Buzzards, Harriers, and Eagles, until we met with several genera, which, alike by their conformation and habits, combined something of the vigor and daring of the Falcons with the more cowardly and gluttonous qualities of the Vultures. These latter were a natural introduction to the study of the true Vultures; here, however, at the threshold, we are met with one conspicuous instance in which the prominent

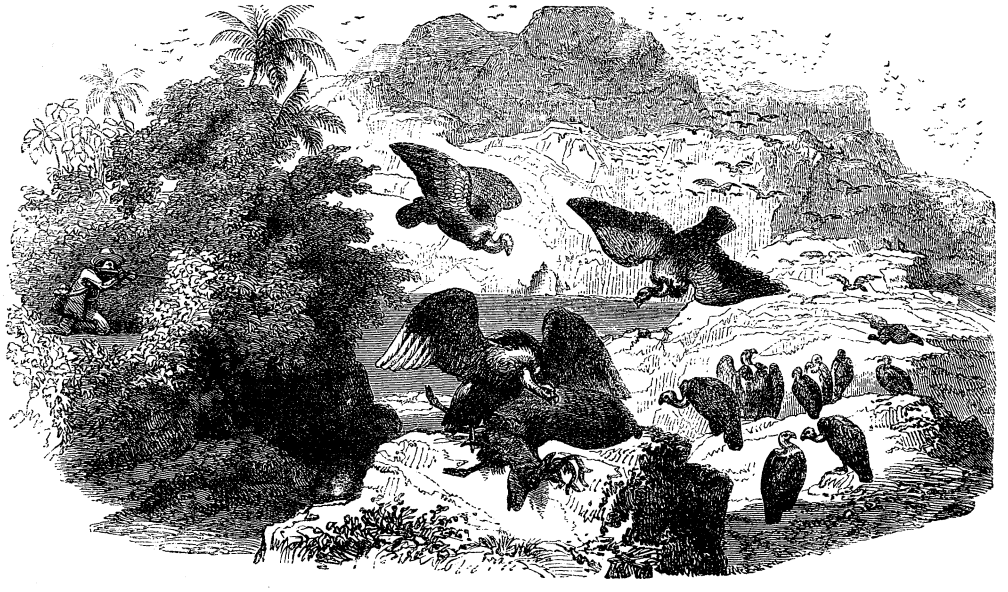
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characteristics of the Eagles and Vultures are combined in an intense degree, so that the species referred to has been bandied by naturalists back and forth between the Eagles and Vultures till its true position became a matter of general doubt. At last it has been established among the Vultures, under the generic title of GYPAETOS: *Gypaetos*, signifying *Vulture-Eagle;* its specific name is *Lammergeyer* or *Lamb-killer* among the Swiss; the *Bearded-Vulture* of English authors; the *Weissköpfige Geier Adler* of the Germans—*G. barbatus*. This is the largest of European birds, being four to four and a half feet long; the spread of its wings about nine feet, sometimes much more. The French expedition to Egypt killed one which measured fourteen feet. It is in fact but little smaller than the condor, and is regarded as having given rise to the fabulous *Roc* of the Arabian tales. The head and upper part of the neck are a dirty white; back and wing-coverts deep gray-brown; lower parts orange-red. The plumage varies greatly with the age. It builds its nest on inaccessible rocks, and lays two whitish eggs, spotted with brown.

Unlike the typical vultures, which are distinguished by their bare necks, indicative of their propensity for feeding on carrion, the lammergeyer has the neck thickly covered with feathers, resembling those of the true eagles, with which it also accords in its bold and predatory habits, pouncing with impetuosity on animals exceeding itself in size; hence the young chamois, the wild goat, the mountain hare, and various species of birds, find in it a formidable and ferocious enemy. Having seized its prey, the lammergeyer devours it upon the spot, the straight form of its talons disabling it from carrying it to a distance. It refuses flesh in a state of putrefaction, unless sharply pressed by hunger. It inhabits the highest mountains of Europe, Asia, and Africa, the chain of the Pyrenees, and the Swiss Alps, Sardinia, Greece, and the Tyrol, the chain of the Caucasus, the Himalaya Mountains, the Siberian and Persian Mountains. It is also found in the lofty mountains of Central Africa, and toward the borders of the Red Sea, principally in the most inaccessible parts of those mountains, and where there is plenty of the larger sort of game. It is especially dreaded in Switzerland, where it is said sometimes to carry off children; but this is not proved. It is asserted with more probability that it sometimes descends upon lambs, calves, goats, and chamois, which it finds on the precipices, and striking them with its breast, dashes them down the rocks, where it afterward devours them.

Genus VULTURE: *Vultur*.—Of these disgusting but useful and necessary birds, there are several genera and many species. The general characteristics are—eyes flush with the head, and not buried under the brow as in the eagles; the tarsi are not covered by protecting plates, but reticulated, covered with small scales let into a sort of network, as they generally are in the wading birds; the beak is long, nearly straight in the greater part of the length of its cutting edges, and hooked only in a portion toward the tip; a greater or smaller portion of the head, and even of the neck, is bare of feathers, and if not absolutely naked skin, covered only with thin, short, and soft down. The power of their talons is by no means in proportion to the size of the birds, and they are not much used as weapons; the bill is the member upon which they chiefly depend, and it has more the character of a cutting than of a killing instrument; their wings are so very long that they are obliged to carry them partially expanded when they walk; they are cowardly birds, and feed chiefly upon carrion, and rarely upon living prey; they often, however, have terrific battles with each other over the carcasses on which they feed, two of them struggling, screaming, and fighting for the same mass of putrid flesh. After they have gorged themselves with food, their craw forms a large protuberance beneath the furcal bone, a flow of fetid humor distils from the nostrils, and they are often in such a state of stupidity and inaction that they are incapable of escape or defense, and one may catch them or knock them down with a stick. Their office in nature is a foul one, and when they have performed it they are foul and offensive birds, but not upon that account the less in character. They are the scavengers of hot climates, and are designed to remove the dead animal matter, which would otherwise breed infection and scatter pestilence over the land. Hence these birds are protected in many of the cities of tropical countries. They have amazing keenness of sight, by which they are able to discern a dead animal while flying over it a thousand or two thousand feet in the air. It is probable that they are assisted by their sense of smell in finding their food, but the sight is their chief dependence.

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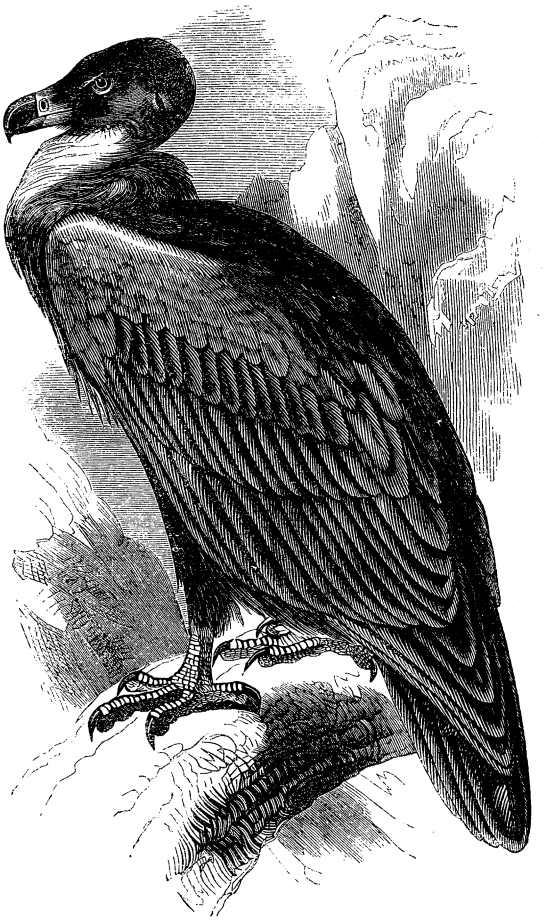
GROUP OF VULTURES.

The Griffon Vulture, or Tawny Vulture, is the Common Vulture of Europe, *V. fulvus:* the head and neck are covered with close-set, short, white, downy feathers; the lower part of the neck is surrounded with a ruff of long, slender, white feathers, sometimes with a slight yellow tinge; on the middle of the breast is a space furnished with white down. The whole of the body, the wings, and the origin of the tail, yellow-brown or Isabella color; quills and tail-feathers blackish-brown; total length exceeding four feet. The female is larger than the male.

The nest of this species is generally formed upon the most elevated rocks, but it often builds on the highest forest trees, and in Sardinia on the loftiest oaks, where the nest of brushwood and roots is more than three feet in diameter. The eggs, which are generally two in number, are of a dull greenish or grayish-white, slightly marked with pale reddish spots, and with a rough surface. Like all the other true vultures, it feeds principally upon dead carcasses, to which it is frequently attracted in very considerable numbers. When it has once made a lodgment upon its prey, it rarely quits the banquet while a morsel of flesh remains, so that it is not uncommon to see it perched upon a putrefying corpse for several successive days. It never attempts to carry off a portion even to satisfy its young, but feeds them by disgorging the half-digested morsel from its maw. Sometimes, but very rarely, it makes its prey of living victims, and even then of such only as are incapable of offering the smallest resistance; for in a contest for superiority it has not that advantage which is possessed by the falcon tribes, of lacerating its enemy with its talons, and must therefore rely upon its beak alone. It is only, however, when no other mode of satiating its appetite presents itself, that it has recourse to the destruction of other animals for its subsistence. After feeding, it is seen fixed for hours in one unvaried posture, patiently waiting until the work of digestion is completed and the stimulus of hunger is renewed, to enable and to urge it to mount again into the upper regions of the air, and fly about in quest of its necessary food. If violently disturbed after a full meal, it is incapable of flight until it has disgorged the contents of its stomach; lightened of which, and freed from their debilitating effects, it is immediately in a condition to soar to such a pitch as, in spite of its magnitude, to become invisible to human sight. In captivity it seems to have no other desire than that of obtaining its regular supply of food. So long as that is afforded, it manifests a perfect indifference to the circumstances in which it is placed.

The Brown Vulture, *V. cinereus, the Vautour Arrian* and *Vautour Noir* of the French; *Cinereous* or *Ash Vulture*, and *Bengal Vulture* of Latham; the *Grauer Geier* of the Germans, is a

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THE BROWN VULTURE.

native of Europe, and is found in lofty mountains, especially in the vast forests of Hungary, the Tyrol, and the Pyrenees; the south of Spain and Italy; accidentally in Dalmatia; more frequently in Sardinia; in Sicily; rarely in Italy and in Germany. Its food consists of dead animals and carrion, but never of living animals, of which it shows fear. It forms the genus *Gyps* of Savigny. Mr. Gould notices a deviation in this species from the true or more typical vultures, manifested in the partially bare neck, open ears, curved claws, and powerful beak.

The Sociable Vulture, or Eared Vulture, *V. auricularis*, the *Oricou* of Levaillant and the French; the *Ghaip* of the Namaqua Hottentots, has the head and greater portion of the neck red and naked, with the exception of a few hardly discernible hairs; beak horn-colored, tinged with yellow at its base; iris chestnut. The folds of red naked skin originate behind the ears, surround the upper part of them, and then descend several inches, being irregular in their outline and nearly an inch broad at their widest part. The throat is covered with hairs inclining to black. This gigantic species, a fit machine for assisting in the clearing of the soil of Africa from the putrid bodies of elephants, hippopotami, rhinoceroses and giraffes, haunts the caverns of rocks, and is altogether a mountain bird. There its night is passed, and there among the lofty crags it retires to repose when it has sated its appetite. Levaillant saw large flocks of them perched at sunrise on the precipitous entrances to their abodes, and sometimes the extent of the rocky region was marked by a continued chain of these birds. Their tails are worn down by friction against their craggy haunts and by the soil of the plains, in consequence of the laborious efforts which they make to raise themselves into the air; when once on the wing, however,

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THE SOCIABLE VULTURE.

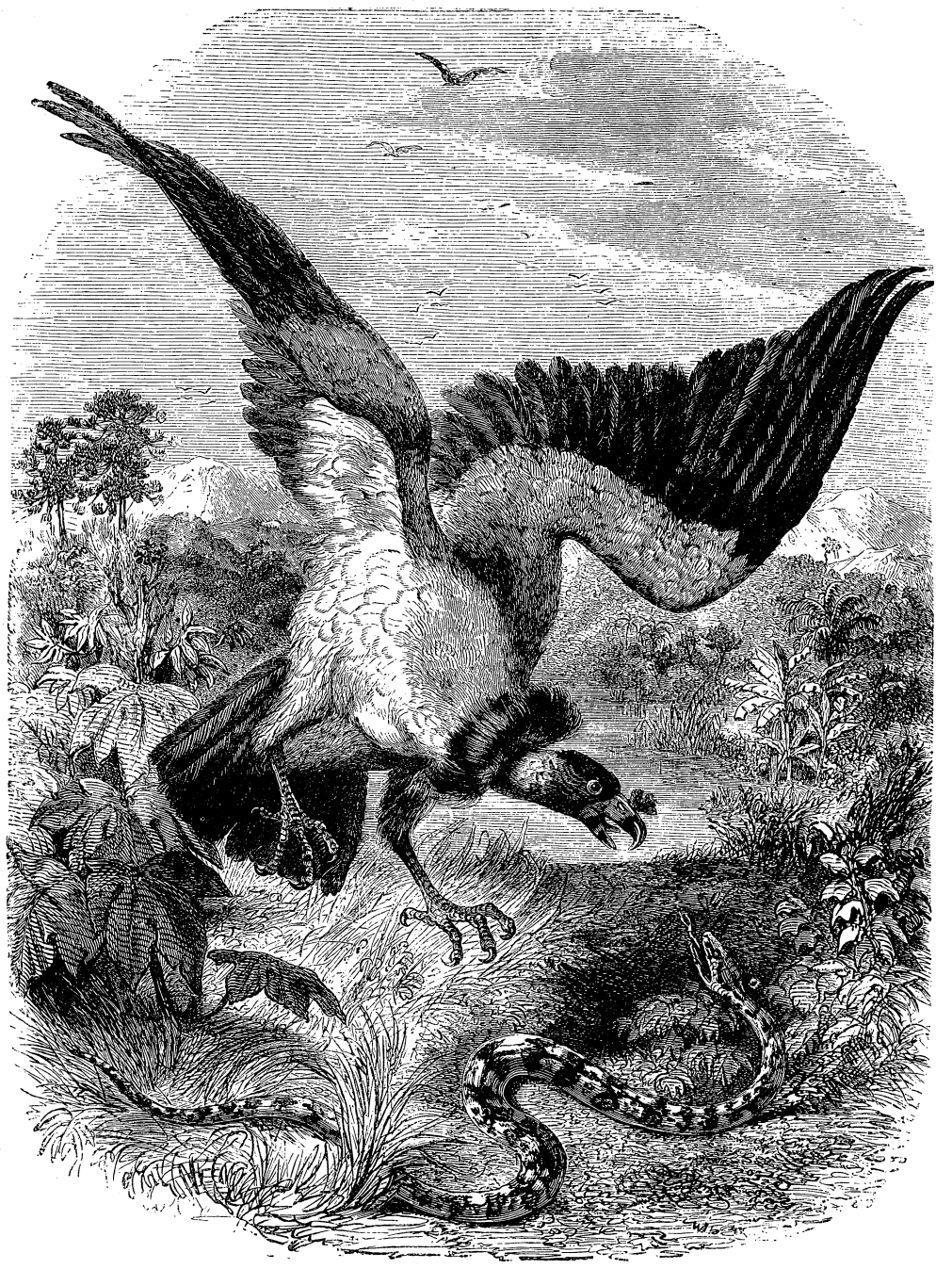
their flight is grand and powerful. They rise higher and higher, till their enormous bulk is lost to human ken; but though beyond the sphere of man's vision, the telescopic eye of the bird is at work. The moment any animal sinks to the earth in death, the imperceptible vulture detects it. Does the hunter bring down some large quadruped beyond his powers to remove, and leave it to obtain assistance—on his return, however speedy, he finds it surrounded by a band of the vultures, where not one was to be seen a quarter of an hour before. This species is a native of South Africa, and has been taken in the neighborhood of Athens.



THF EGYPTIAN VULTURE.

Other species of this genus are the PONDICHERRY VULTURE, *V. Ponticerianus;* the INDIAN VULTURE, *V. Indicus;* KOLBE'S VULTURE, *V. Kolbii*, found in Africa; the CALOTTE VULTURE,

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THE KING VULTURE.

V. occipitalis, found in Africa; the Monk Vulture, *V. monachus*, the *V. chincou* of Temminck, found in Africa and Asia; the Chaugoun Vulture, *V. Indicus* of Latham, found in the environs of Calcutta and Pondicherry.

Genus NEOPHRON: *Neophron.*—This includes the Egyptian Vulture, *N. percnopterus*—the *Vautour Ourigourap* of Levaillant; the *Rhachamah*, or *Pharaoh's Hen*, of Bruce and others; the *Maltese Vulture* of Latham. The head and only the front of the neck are covered with a

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naked skin of a livid yellowish color; the whole plumage is pure white, except the great quill-feathers, which are black; feathers of the occiput long and loose; cere orange, iris yellow, mandibles blackish; feet livid yellow, claws black, tail very much graduated; length two feet and a few inches. Its plumage varies much, according to age. It does not congregate, except when an all-attractive carcass calls them together, but goes in pairs, the male and female seldom parting company In the districts which the species inhabits, every group of the natives has a pair of these vultures attached to it. The birds roost on the trees in the vicinity, or on the fences which bound the inclosures formed for the cattle. They are to a certain degree domiciled and are harmless The people do them no injury; on the contrary, they are glad to see and encourage them, because they clean the premises of all the offal and filth they can find. In default of other food they eat frogs, lizards, and snakes. They are most common in Africa, but are also often seen in Southern Europe and in Asia.

The Monk Neophron, *N. monachus*, is a species of Western Africa.

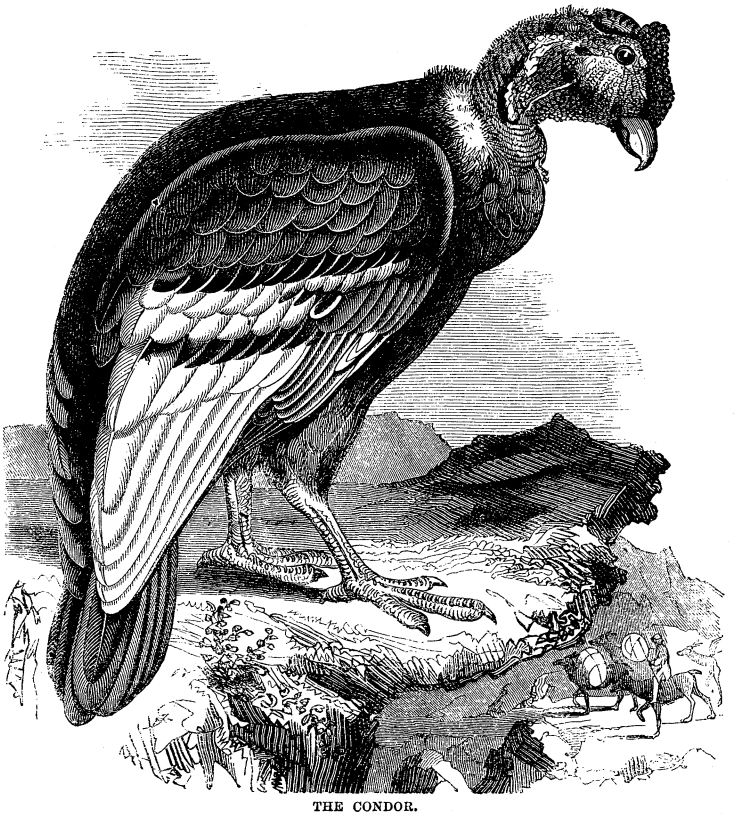
Genus SARCORAMPHUS: *sarcoramphus.*—Of this there is a single species, the King Vulture, or King of the Vultures—the *iribubicha* of Azara, and the *Cozcaquauhtli* or *Queen of the Vultures*, of the Mexicans—*S. papa.* The naked skin of the head and neck is brilliantly colored; beak reddish, with a shade of black; cere bright orange—prolonged between the nostrils into a comb about an inch and a half long—loose in texture, and falling on either side of the bill when the head is erect; back of the head covered with short down inclining to black. On each side behind the eye several broad and deep wrinkles of the skin, whence rises a thick and prominent fold extending obliquely downward along the neck, reddish-brown mixed with blue, and marked with many lines of small black hairs. From the bright-red upper part of the neck the color gradually lessens in intensity, fading into orange and yellow toward the lower part. Round the bottom of the neck is a broad ruff of soft, downy, deep ashy-gray feathers. It is found in all the tropical parts of America, and is frequently met with as far north as Florida. It frequents the plains and wooded hills, feeding on dead carcasses, sometimes making a meal of what the jaguar has left. It often sits aloft on the branch of a dead tree, watching for hours the herds of cattle, and, when opportunity offers, pouncing down on a new-born calf, ere yet it is able to stand M. D'Orbigny saw a poor cow standing with her calf between her legs, and by her horns and her bellowings keeping off a flock of vultures that sought to devour the helpless young animal. The name of *King of the Vultures* is bestowed partly on account of the red fleshy wattle, which appears like a diadem on his head, and partly also on account of the tyranny which he exercises over the smaller kinds of vultures, which stand aloof, not daring to approach, while he is making his gluttonous repast.

The Sacred Vulture, *S. sacer;* described as found in Florida by Bartram many years ago, has not since been identified. The crown of the head is red; the skin of the neck is bare and annulated nearly to the breast. The plumage is white or cream-colored, except the quill-feathers of the wings, which are dark brown; the tail is white, tipped with brown. It has been conjectured that this bird may have belonged to some one of the species we have described.

Genus CONDOR: *Gryphus.*—This includes a single species, the Condor—the *Great Vulture of the Andes; G. typus* of Isidore Geoffroy. It is the largest known bird of prey, being about four feet long, with nine feet average expanse of wing, sometimes, however, extending to fourteen; still it is but little larger than the lammergeyer, but there is something in its majestic flight, its ponderous aspect, and the sublime scenery among which it is observed, that makes it appear altogether more gigantic than any other bird. Even to Humboldt, when traveling among the towering Andes—seeing it perched on the steepling cliffs, or nestling upon the mountain heights at the verge of perpetual snow—it had the appearance of a winged giant, and it was not until he had made repeated measurements that the illusion vanished.

The real facts in the case are, however, sufficiently startling. "These birds," says Nuttall, "are known to soar to an elevation almost six times greater than that at which the clouds are ordinarily suspended over our heads. At the immense height of nearly six perpendicular miles, the condor is seen majestically sailing in the ethereal space, watchfully surveying the vast expanse in quest of his accustomed prey. Elevated farther above our planet than any other animal, impelled

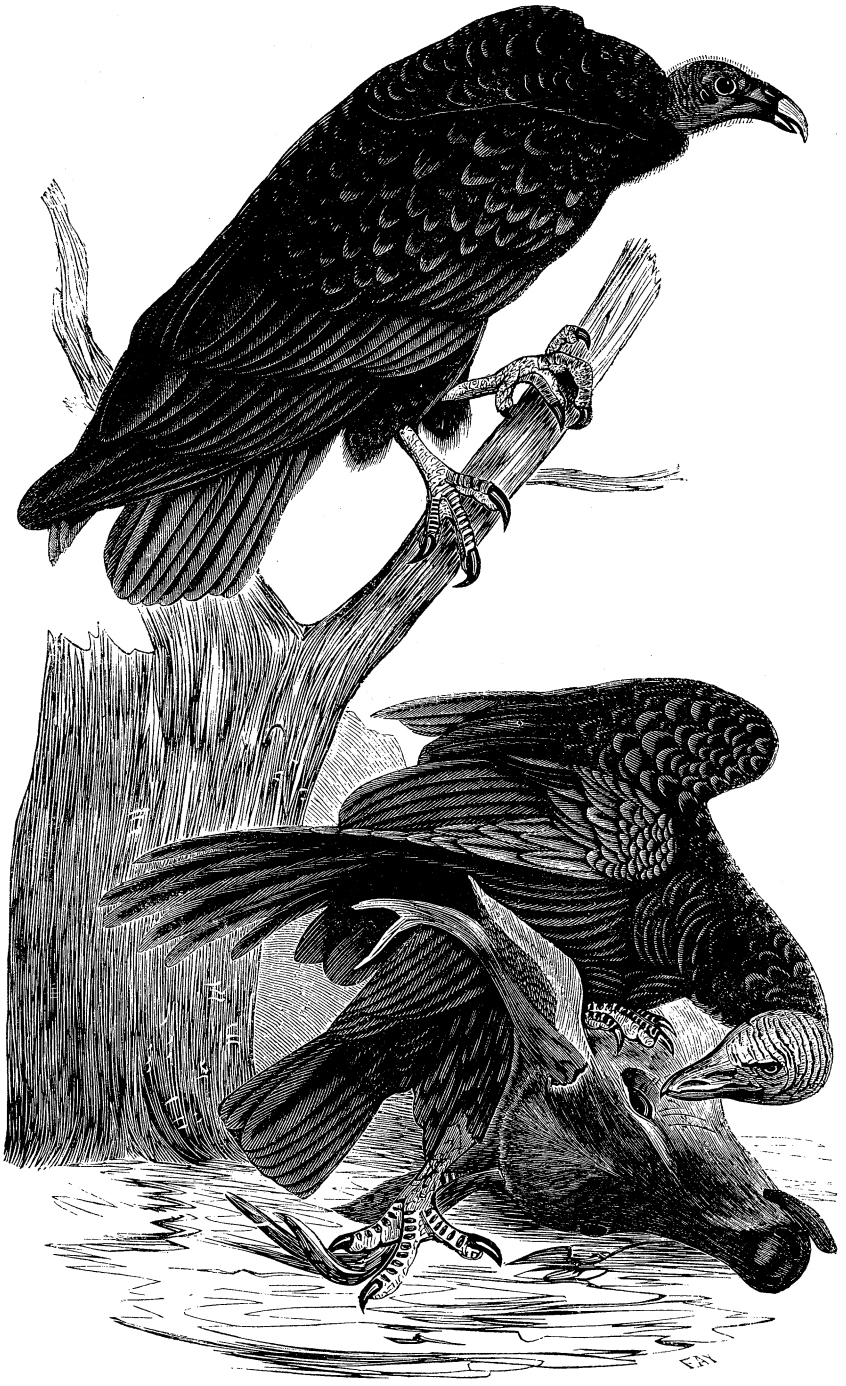
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THE CONDOR.

by hunger alone, he descends into the nearest plains which border the Andes; but his stay in this region is only for a few hours, as he prefers the desolate and lofty mountains and this rarefied aerial space, in which human life would soon become extinct. The rocky eyries of the Peruvian Andes, whose plain is elevated about fifteen thousand feet above the level of the sea, have hence obtained the vernacular name of *Condor Nests*. Here, perched in dreary solitude on the crests of scattered rocks, these dark, gigantic birds are seen silently reposing like melancholy specters, rousing only from their slumbers at the calls of hunger. Their peculiar residence is the great chain of the high Andes, where they associate, three or four together, upon the points of cliffs, without either fearing or injuring man, so that they may be approached within four yards without showing alarm, or making on their part any attempt at attack or defense. Hardly an instance is really known of their even assaulting an infant, though some credulous naturalists, with the exaggerating privilege of travelers, have given accounts of their killing young persons of even ten or twelve years of age. Their ability for such rapine is not to be doubted, but their natural cowardice forbids the attempt. A pair of condors will sometimes unite and attack the deer, the puma, the vicuna, and the lama, and bring them down by a long and harassing pursuit. They will also sometimes chase the wild heifer, occasionally wounding it with their bill and claws, until the unfortunate animal, stifled and overcome with fatigue, extends its tongue, which these monsters instantly seize and devour as a precious morsel. They also tear out the eyes of their victim, which soon falls prostrate to the earth and expires. The condors then gorge themselves, and afterward rest in stupidity and almost gluttonous inebriation, perched upon the highest neighboring rocks. The formidable hunter, now loaded with his meal, may be driven about without his attempting to fly, and in this state the Indians sometimes pursue them with the lasso and easily take them captive. Thus restrained, the condor makes extraordinary efforts to rise in the air, but fatigued by the attempt, he begins to disgorge himself freely, an effort he appears to assist by lengthening and shortening his neck, and by bringing forward the sheath of his back."

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THE TURKEY BUZZARD. THE BLACK VULTURE.

These birds will approach dwellings when allured by the scent of food, and a dead animal will draw down a crowd of these gluttons where none were before visible; they tear and eat with the greatest voracity, pushing with their feet and clapping their wings, and seeming to be in an ecstasy of mingled rage and delight. The spectacle of the feeding of the condors in the Garden

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of Plants, at Paris, which the writer of this has often witnessed—on which occasion these creatures, usually dozing on their perch, are suddenly roused to demoniac frenzy, and scream and fight and gorge themselves with a voracity that seems like madness—is horrible beyond description.

The condor has its chosen home in the most elevated peaks of the Andes; but it is also seen in the Cordilleras of Central America and Mexico, and it is said also in the southern part of the Rocky Mountain range. It makes no nest, but deposits its eggs upon the naked rock; these are wholly white, and three or four inches in length. It is said that the female remains with her brood for a year; the young have no feathers; the body, for several months, is covered only with very fine down or whitish frizzled hair, which resembles that of young owls. This down disfigures the young bird so much that in this state it appears almost as large as an adult.

Genus CATHARTES: *Cathartes.*—This genus includes several species, all American, three of them found within the boundaries of the United States. That which is most familiarly known is the TURKEY-BUZZARD or TURKEY-VULTURE, *C. aura*—the *Vultur aura* of Wilson—which extends from the southern boundary of New York to the West Indies and South America, being abundant in the warm regions and rare in the northern portions of its range. In the Middle States it is partially migratory, the greater part retiring to the south on the approach of cold weather. But numbers remain all the winter in Maryland, Delaware, and New Jersey, particularly in the vicinity of the large rivers and the ocean, which afford a supply of food at all seasons. In New Jersey it hatches in May, the deep recesses of the solitary swamps of that state affording situations well suited to the purpose. The female is at no pains to form a nest with materials; but, having chosen a suitable place, which is either a truncated hollow tree, an excavated stump, or log, she lays on the rotten wood from two to four eggs, of a dull, dirty white, or pale cream color, splashed all over with chocolate, mingled with blackish touches, the blotches largest and thickest toward the great end; the form something like the egg of a goose, but blunter at the small end; length two inches and three-quarters. The male watches often while the female is sitting, and, if not disturbed, they will occupy the same breeding-place for several years. The young are clothed with a whitish down similar to that which covers young goslings. If any person approach the nest, and attempt to handle them, they will immediately vomit such offensive matter as to compel the intruder to a precipitate retreat. This species are gregarious, peaceable, and harmless, never offering any violence to a live animal, or depriving the husbandman of his stock. Hence, though in consequence of their filthy habits they are not beloved, they are respected and tolerated for their usefulness where they are most needed. They generally roost at night in flocks on the limbs of large trees, and they may be seen on a summer morning spreading out their wings to the rising sun, and remaining in that posture for a considerable time.

These birds, unless when rising from the earth, seldom flap their wings, but sweep along in ogees, and dipping and rising lines, and move with great rapidity. They are often seen in companies, soaring at an immense height, particularly previous to a thunder-storm. Their wings are not spread horizontally, but form a slight angle with the body upward, the tips having an upward curve. Their sight is astonishingly acute, and they never fail to discover carrion, even when at the distance of several miles from it. When once they have found a carcass, if not molested they will not leave the place until the whole is devoured. At such times they eat so immoderately that frequently they are incapable of rising, and may be caught without much difficulty; but few that are acquainted with them will have the temerity to undertake the task. A man in the state of Delaware, a few years since, observing some turkey-buzzards regaling themselves upon the carcass of a horse which was in a highly putrid state, conceived the design of making a captive of one, to take home for the amusement of his children. He cautiously approached, and, springing upon the unsuspicious group, grasped a fine, plump fellow in his arms, and was bearing off his prize in triumph, when lo! the indignant vulture disgorged such a torrent of filth in the face of our hero, that it produced all the effects of the most powerful emetic, and forever cured him of his inclination for turkey-buzzards.

"The vulture," adds Wilson, from whom we have chiefly taken the preceding account, "is included in the catalogue of those fowls declared unclean and an abomination by the Levitical law, and which the Israelites were interdicted eating. We presume that this prohibition was relig-

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TURKEY BUZZARDS.

iously observed, so far, at least, as it related to the vulture, from whose flesh there arises such an unsavory odor that we question if all the sweetening processes ever invented could render it palatable to Jew, Pagan, or Christian."

The turkey-buzzard is two feet long, with six feet expanse of wing; the head and neck, for an inch and a half below the ears, are covered with a reddish, carunculated skin; above the color is black, glossed with green and bronze, with purplish reflections; beneath it is sooty black.

The Black Vulture, or Carrion Crow—the Urubu, of South America, *Vultur atratus* of Wilson—is included in the genus *Coragyps*, meaning *Crow-Vulture*, of Le Maout. It is of the size of a small turkey, the body being of a shining black; the skin of the head and neck black and wrinkled. This species is even more abundant than the preceding, extending in its range from North Carolina to Cape Horn. In the towns and villages of the Southern States, particularly Charleston and Savannah, they may be seen, either sauntering about the streets, sunning themselves on the roofs of the houses and fences, or, if the weather be cold, cowering around the tops of the chimneys, to enjoy the benefit of the heat, which to them is a peculiar gratification. They are protected by law, or usage; and may be said to be completely domesticated, being as common as the domestic poultry, and equally familiar. The inhabitants are disgusted with their filthy, voracious habits; but they have a respect paid to them, as scavengers whose labors are subservient to the public good. "It sometimes happens," says Wilson, "that, after having gorged themselves, these birds vomit down the chimneys, which must be intolerably disgusting, and must provoke the ill-will of those whose hospitality is thus requited."

These birds are indolent, and may be observed in companies, loitering for hours together in one place. They do not associate with the turkey-buzzards, and are much darker in their plumage than the latter. Their mode of flight also varies from that of the turkey-buzzard: the black vulture flaps its wings five or six times rapidly, then sails with them extended nearly horizontally; the turkey-buzzard seldom flaps its wings, and, when sailing, they form an angle with the body

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THE BLACK VULTURE.

upward. The latter, though found in the vicinity of towns, rarely venture within them, and then always appearing cautious of the near approach of any one. It is not so impatient of cold as the former, and is likewise less lazy. The black vulture, on the ground, hops along very awkwardly; the turkey-buzzard, though seemingly inactive, moves with an even gait. The latter, unless pressed by hunger, will not eat of a carcass until it becomes putrid; the former is not so fastidious, but devours animal food without distinction. It is said they sometimes attack young pigs, and eat off their ears and tails, and we have even heard stories of their assaulting feeble calves, and picking out their eyes.

In one of Wilson's journals we have the following:—

"*February* 21, 1809.—Went out to Hampstead this forenoon. A horse had dropped down in the street, in convulsions; and dying, it was dragged out to Hampstead, and skinned. The ground, for a hundred yards around it, was black with carrion crows; many sat on the tops of sheds, fences, and houses within sight; sixty or eighty on the opposite side of a small run. I counted, at one time, two hundred and thirty-seven, but I believe there were more, besides several in the air over my head, and at a distance. I ventured cautiously within thirty yards of the carcass, where three or four dogs, and twenty or thirty vultures, were busily tearing and devouring. Seeing them take no notice, I ventured nearer, till I was within ten yards, and sat down on the bank. Still they paid little attention to me. The dogs, being sometimes accidentally flapped with the wings of the vultures, would growl and snap at them, which would occasion them to spring up for a moment, but they immediately gathered in again. I remarked the vultures frequently attack each other, fighting with their claws or heels, striking like a cock, with open wings, and fixing their claws in each other's head. The females, and, I believe, the males likewise, made a hissing sound, with open mouth, exactly resembling that produced by thrusting a red-hot poker into water; and frequently a snuffling, like a dog clearing his nostrils, as I suppose they were

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THE CALIFORNIA VULTURE.

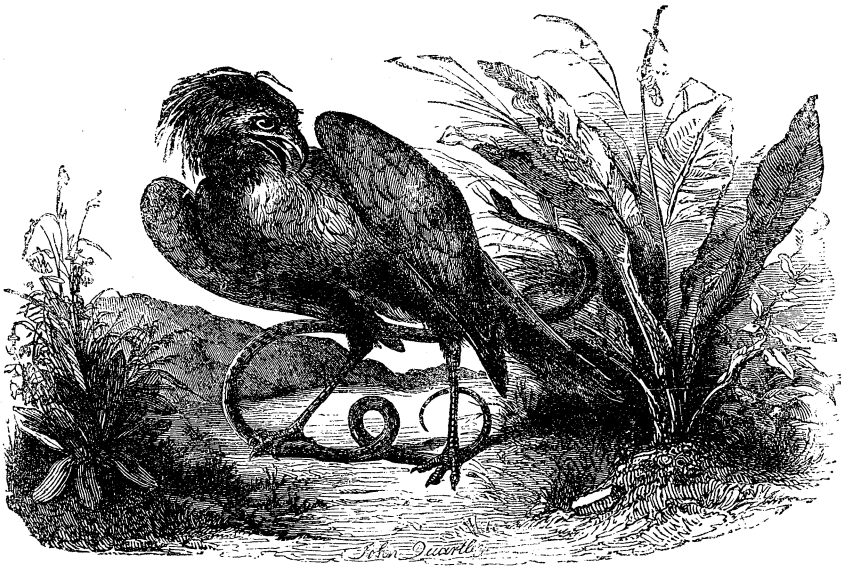
theirs. On observing that they did not heed me, I stole so close that my feet were within one yard of the horse's legs, and again sat down. They all slid aloof a few feet; but, seeing me quiet, they soon returned as before. They kept up the hissing occasionally. Some of them, having their whole heads and legs covered with blood, presented a most savage aspect. Still as the dogs advanced, I would order them away, which seemed to gratify the vultures; and one would pursue another to within a foot or two of the spot where I was sitting. Sometimes I observed them stretching their necks along the ground, as if to press the food downward."

The California Vulture, *C. Californianus*, is a very large species, measuring three and a half feet; the head and neck are of an orange-color and bare, with a few short feathers on the vertex; a ruff of long lanceolate feathers begins at the neck and continues to the breast; the whole plumage is black, with some feathers tipped with brown; the tail is slightly rounded. It is found only on the western side of the Rocky Mountains, where it lives chiefly in the vicinity of rivers, feeding on fish.

Other species of this genus are Burrough's Vulture, *C. Burrovianus*, the smallest of known vultures; its plumage is black, and its length twenty-two inches; it is found in Mexico, and no doubt further south. Probably it exists in California.

Genus GYPOGERANUS: *Gypogeranus;* this includes a single species, *G. serpentarius*, which can hardly be classed with either the falcons, eagles, or vultures. It is called the Serpent Eater because it feeds on serpents, and Secretary Vulture because it has a tuft of quills or feathers on the head, reminding one of the quills which clerks or secretaries carry behind their ears. It lives much on the ground, and measures three feet in length; in appearance it is something like

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THE SECRETARY VULTURE.

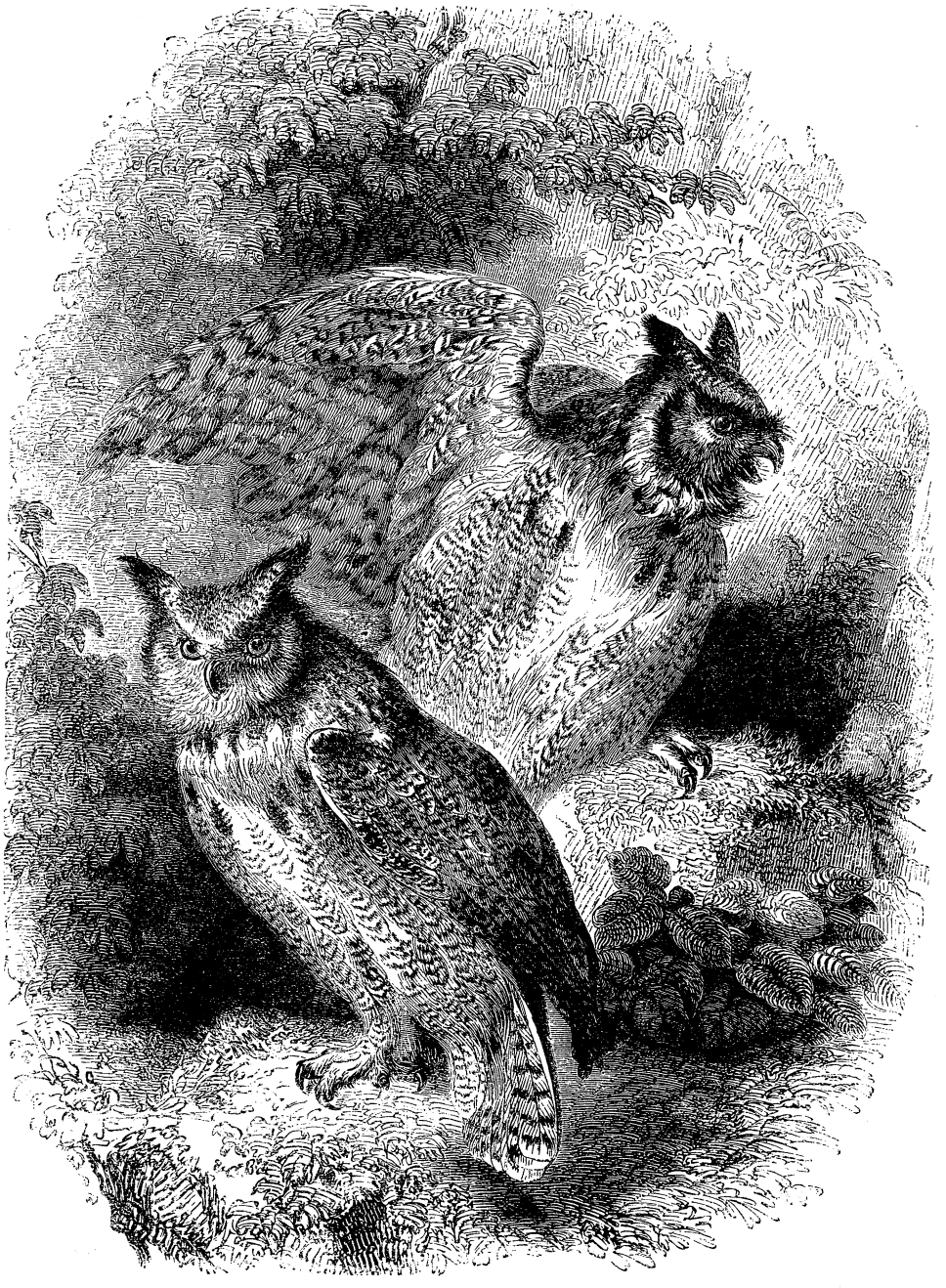
two very dissimilar birds, the eagle and the crane. The color is bluish-gray, with a reddish-brown tinge on the wings. It is found in Southern Africa, and builds on high trees, and lives in pairs, never collecting in flocks. It runs with considerable swiftness, and attacks even large serpents with great courage and dexterity. The following interesting account is furnished by Sparman :

"In descending from a mountain into a very deep bog, I perceived, nearly perpendicularly below me, a bird which raised and lowered itself very rapidly, with very extraordinary motions. Although I well knew the secretary, and had killed many of these birds at Natal, it was impossible for me to recognize it in the vertical situation in which I found myself, and I only suspected that it was one from its bearing. Having found means, by favor of some rocks, to approach sufficiently near, noiselessly and without being discovered, I found that this bird was a secretary combating a serpent. The fight was very sharp on both sides, and the skill equal on the part of each of the combatants. But the serpent, which perceived the inequality of its strength, employed that adroit cunning which is attributed to it, in order to save itself by flight and regain its hole; while the bird, divining its intention, stopped it at once, and throwing itself before the serpent by one spring, cut off its retreat. Wherever the reptile essayed to escape there it always found its enemy. Then, uniting skill with courage, it erected itself fiercely, to intimidate the bird, and presented, with a frightful hiss, a menacing gape, inflamed eyes, and a head swollen with rage and poison. Sometimes this offensive resistance suspended hostilities for an instant; but the bird soon returned to the charge; and covering its body with one of its wings as with a shield, struck its enemy with the other, with the bony protuberance of which I have already spoken, and which, like small clubs, overpowered it the more surely, inasmuch as it presented itself to the blows. In effect, I saw it reel and fall extended: then the conqueror threw himself upon it to finish his work; and with one blow of the bill split its skull. At this moment, having no further observations to make, I killed it. I found in its crop, on dissecting it, eleven rather large lizards, three serpents as long as one's arm, eleven small tortoises very entire, many of which were about two inches in diameter, and, finally, a quantity of locusts and insects. The lizards, the serpents, and the tortoises had all received the stroke of the bill on the head."

This bird is capable of being tamed, and attempts have been made to introduce it into Martinique, for the purpose of destroying venomous serpents.

Other species of this genus have been named as the *G. Capensis*, *G. Gambiensis*, and *G. Phillippensis*, but none of these are established.

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THE GREAT AMERICAN HORNED OWLS.

THE STRIGIDÆ OR OWLS.

The two preceding families of Falcons and Vultures are generally active during the day, and hence are called *Diurnal Birds of Prey*. We now come to the *Owls*, which reverse this system, and, sleeping by day and entering upon the duties and pleasures of life by night, are called *Nocturnal Birds of Prey*. In all ages and countries they seem to have made a powerful impression on the human imagination, usually of a gloomy and terrific nature. Seldom seen except as dim and

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flitting specters in the twilight, or in the deeper shadows of night, and then, uttering strange and melancholy cries from the depths of gloomy forests, or ghastly ruins, or perched on the black, crumbling towers of some ghost-haunted castle, accursed in popular imagination—they very naturally became associated with the loathed and dreaded powers of darkness. Their strange forms, their large heads, staring eyes, and uncouth gestures, served to deepen these sinister impressions, so that they came to be regarded as birds of ill omen, and even as messengers of coming doom.

Shakspeare says:

"Out, ye owls! nothing but songs of death!"

and thus expresses the common sentiment of the time. Spencer says, in a similar vein:

"The rueful stritch still waiteth on the beere,
The whistler shrill that whoso heares doth die."

And again:

"The ill-faced oule, Death's dreaded messenger."

And an old dramatist says:

"When screech-owls croak upon the chimney-tops,
It's certain then you of a corse shall hear."

Pliny had said, ages before, to use the quaint translation of Philemon Holland, "The scritch-owle betokeneth alwais some heavie newes, and is most execrable and accursed and unseemly in the presages of publick affaires. He keepeth ever in deserts, and loveth not onely such unpeopled places, but also that are horrible and hard of accesse. In summer he is the verie monster of the night, neither crying nor singing out cleere, but uttering a certain heavie grone of dolefull moning. And therefore if he be seene to flie either within cities, or otherwise abroad in any place, it is not for good, but prognosticateth some fearful misfortune. Howbeit, I myself know that he hath sitten upon many houses of privat men, and yet no deadly accident followed thereupon. He never flieth directly at ease, as he would himselfe, but evermore sidelong and byas, as if he were carried away with the wind or somewhat else."

Hood, in his poem of the "Haunted House," has grouped the owl with other objects of general horror and aversion, in a manner forcibly to illustrate the popular superstitions to which we allude:

"On every side the aspect was the same—
All ruined, desolate, forlorn, and savage;
No hand or foot within the precinct came
To rectify or ravage.

"For over all there hung a cloud of fear;
A sense of mystery the spirit daunted,
And said, as plain as whisper in the ear,
'The house is haunted!'

"The centipede along the threshold crept;
The cobweb hung across in mazy tangle,
And in its winding-sheet the maggot slept
At every nook and angle.

"The startled bats flew out—bird after bird;
The screech-owl overhead began to flutter,
And seemed to mock the cry that she had heard
Some dying victim utter.

"The wood-louse drooped and rolled into a ball,
Touched by some impulse occult or mechanic;
And nameless beetles ran along the wall
In universal panic.

"The subtle spider, that from overhead
Hung like a spy on human guilt and error,
Suddenly turned, and up its slender thread
Ran with a nimble terror.

"Huge drops rolled down the walls as if they wept,
And where the cricket used to chirp so shrilly,
The toad was squatting, and the lizard crept
On that damp hearth and chilly."

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A clever writer in "Household Words" humorously traces this common prejudice in various languages as follows:

"Our polite French ally makes up his mouth and says *Hibou*, with a strong and spiteful accentuation of the last syllable, which is the obnoxious root of the name in nearly all languages; or he speaks through his nose, as none but a Frenchman can speak, and stigmatizes the poor thing as a *Chat-Huant* or hooting-cat, a designation at once illogical and illiberal. The soft-voiced Italian chokes with the malicious epithet *Gufo;* the grave Spaniard, taking a cigarito from his lips, sonorously exclaims *Buho;* the Lower Austrian imitates the Castilian as well as he can, and cries *Buhu;* while the German, with wondering eyes and unmeaning face, delivers himself of *Eule*—which he pronounces very like *oily*—as if he had hit upon something superlatively characteristic and transcendental. Vulgarity marks the treatment which the owl experiences in England. *Madge-howlet* is, perhaps, the least ungentlemanlike of the names we give; but a number of offensive adjectives are freely applied to designate a bird quite as estimable as many that enjoy a much better character. In the Highlands of Scotland the owl is served out, so to speak, in barbarous Celtic, as a *Corrasgreachag*, or a *Cailleach-oidhche*, words which I defy the least harmonious bird of night itself to pronounce; and the Welsh leave you to choose between *Dylluan Wen* and *Aderyn-y-Corph*, both of which, you may be sure, mean something disagreeable. The Red Indians of North America, who know no better, call their owl *Cobadecootch* and *Wapohoo*, and the native Australians, who ought to be the last people to sneer at others, derisively say *Buck-buck* when they speak of the Bird of Wisdom. The Japanese have a canine notion of our friend—perhaps they believe them to be feathered dogs—and whisper *Howo-waiwo* when he sails across their path. The Arabs, with their deep, gutteral voices, say *Khufj;* but what word the Persians use I decline to mention. This enumeration might be greatly extended. Enough, probably, has been instanced to show that the owl is not in the slightest degree indebted to mankind for the ordinary politeness that is due to every stranger."

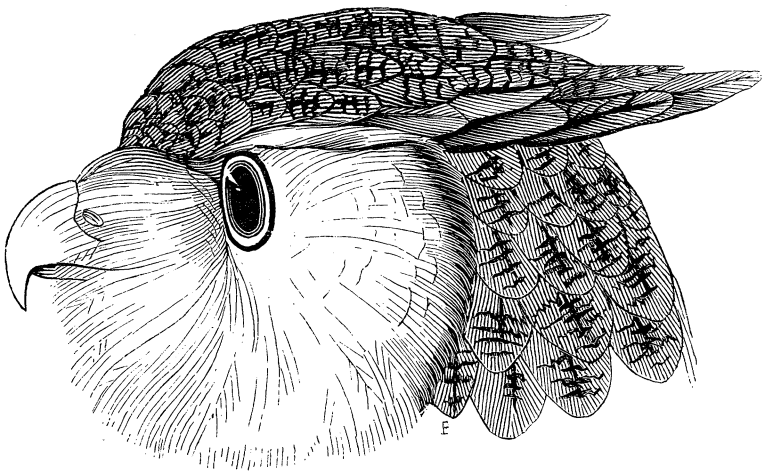
Such are the popular impressions which have been entertained for ages in respect to the owl—the offspring of ignorance and that tendency of mankind to fill every space which has not been made familiar by experience, with spirits of darkness. It is the mission of science to dissipate these foul inventions; it is especially the purpose of such a humble work as this to remove the injurious and mischievous fictions which ignorance, the fruitful mother of prejudice and superstition, has woven around many of the objects which God has created and placed in communication, more or less intimate, with mankind. The owl, truly and properly viewed, is calculated to excite not merely curiosity, but gratified wonder: it is so constituted and so adapted to the purposes of its creation as to be the theme of unbounded admiration among naturalists; it is also, in fact, so far from being an enemy of man, that it is in reality one of his best friends; for, living upon vermin that devour our substance, it is the protector of our granaries and larders. Instead of being a gloomy and loathsome monster, it is in fact a cheerful bird, singing, dancing, and rollicking in its daylight of darkness; it is a good liver, and on proper occasions, a merry-maker, roisterer, and Robin Goodfellow—nay, even a buffoon, as our pages hereafter will show. In its moral qualities it is most exemplary. It not only enjoys all the pleasures of making love, of courtship and flirtation, of nest-building, hatching, and raising the young, of hushing the little dears to slumber by gossip and song—which we, who have not an ear for such music, call hooting and screeching—but its parental devotion, in prosperity and adversity, is really worthy of admiration. Connubial faith and felicity are marked features in the owl's domestic life; its providence is proverbial. It is profoundly weather-wise, and by its whoopings, to those who are versed in these things, announces the coming storm. These facts should not be reflected upon in vain. A bird that for six thousand years has been held to be accursed, in the light of modern science is proved to be a good and genial and worthy member of God's creation. Let us be careful how we venture to affirm that any thing God has made, is accursed!

To understand the owl, we must regard him from his own point of view. He is made for the night, as we are for the day. Daylight is darkness to him; sunset is his sunrise. During the day he is blind, and nothing can exceed the awkwardness and stupidity of his appearance at such a time. But when evening approaches, his whole being is transformed. He then glides forth

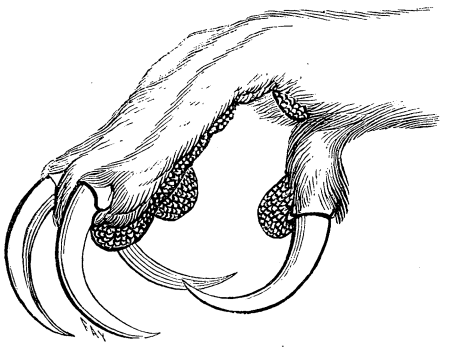
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upon the air, moving as if by volition, bending, winding, and circling hither and thither, noiseless as a shadow, and with the utmost grace and facility. His large eyes—before so vacant—are now full of expression, and like those of a cat, penetrate the darkest caverns, glance into the crannies of rocks and walls, and sweep the whole view with a keen, rapid, and sagacious scrutiny. He is not solitary, for his kindred are with him, and he enjoys all the pleasures of society. He sings, and there are those around who delight in his performance. In short, it was the will of the Creator that even the night should not be wholly barren of life and enjoyment, and so He made the Owl, and various other creatures, to fill this vacuum, and no reflecting mind can fail to remark with wonder and admiration, how perfectly these creatures are adapted to their condition.

The form and structure of the owl are so peculiar as to arrest the attention of every beholder.



HEAD OF THE EAGLE OWL.



FOOT OF THE EAGLE OWL.

The large, cat-like head and face, sometimes set off by tufts of feathers which have the appearance of ears, constitute their most characteristic features. The large eyes, directed in front, inclosed by feathers in the form of a shell, give added effect to the staring expression of the countenance. Their plumage is soft and downy, the edges being recurved so as to render their flight noiseless; the eyes are fixed in their sockets, so that the bird, in following an object with its sight, is obliged to turn its head, whence the old joke, that a man by going round and round beneath a tree on which an owl is sitting, will cause it to twist its head off. Though the appearance of the bird is plump, its body is in fact little more than skin and bones. The hearing is said to be more acute than that of any other member of the feathered tribes. The wings are short, the bill hooked, the feet similar to those of other predacious birds. The eggs are generally two, sometimes three or four. They feed for the most part on mice, moles, birds, and insects. Most of those found in the United States are in some degree migratory. These are the general characteristics; but among the numerous species there are striking peculiarities.

The owls—of which one hundred and forty species have been described, forty of them belonging to our hemisphere—are divided into several families by some naturalists; we shall, however, follow those who divide them only into genera and species, first noticing those which are called *Day Owls*, and then those which are more strictly *Night Owls*.

Genus SURNIA: this includes those species which resemble in their form, aspect and habits the falconidæ, and hence are called *Hawk-Owls*. Their characteristics are: the head deprived of ears or tuft; the concha small, and without operculum; the bill short; the legs feathered to the feet; the wings obtuse; the tail long and tapering. The species are partially diurnal.

The Hawk Owl, Day Owl, or Canada Owl, *S. funerea*, the *S. caparacoch* of Chenu, the Long-tailed Siberian Owl of Buffon, *Paypaw Theecawsew* of the Cree Indians, the *Ood-no-*

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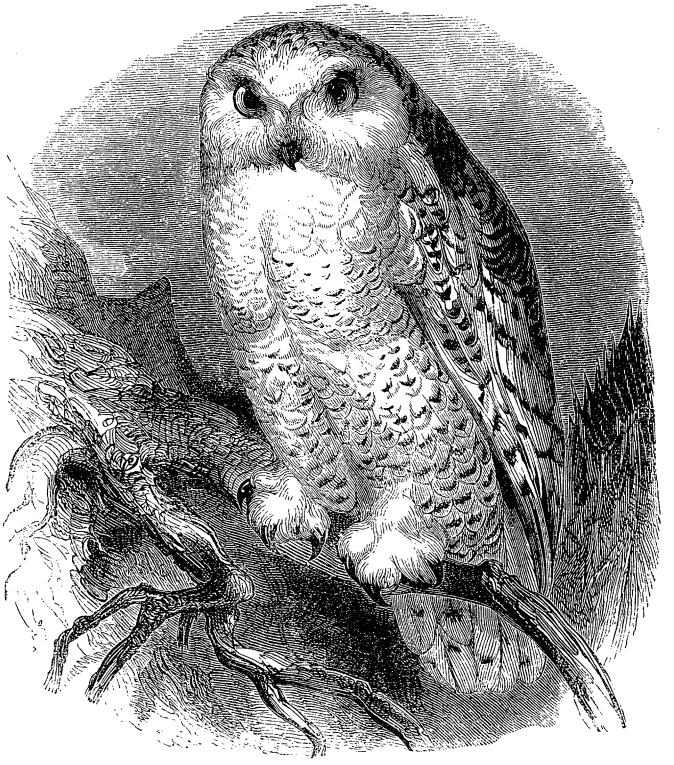


THE CANADA OWL.

Hœoot of the Esquimaux, is brown and white-spotted above, of various forms; white spots on the borders of the wings, on a brown ground; lower parts white transversely striped with brown; length fifteen to eighteen inches. It is common to both continents, being most abundant at the north, but is often seen as far south as Pennsylvania. Wilson thus describes it:

"This is an inhabitant of both continents, a kind of equivocal species, or rather a connecting link between the hawk and the owl tribes, resembling the latter in the feet, and in the radiating feathers round the eye and bill; but approaching nearer to the former in the smallness of its head, narrowness of its face, and in its length of tail. In short, it seems just such a figure as one would expect to see generated between a hawk and an owl of the same size, were it possible for them to produce; and yet is as distinct, independent, and original a species as any other. It has also another strong trait of the hawk tribe—in flying and preying by day, contrary to the general habit of owls. It is characterized as a bold and active species, following the fowler, and carrying off his game as soon as it is shot. It is said to prey on partridges and other birds; and is very common at Hudson's Bay, where it is called by the Indians *Coparacoch*. We are also informed that this same species inhabits Denmark and Sweden, is frequent in all Siberia, and on the west side of the Uralian chain as far as Casan and the Volga; but not in Russia. It was also seen by navigators near Sandwich Sound, in latitude 61° north. It is worthy of remark, that, in all owls that fly by night, the exterior edges and sides of the wing-quills are slightly recurved, and end in fine hairs or points; by which means the bird is enabled to pass through the air with the greatest silence—a provision necessary for enabling it the better to surprise its prey. In the hawk-owl now before us, which flies by day, and to whom this contrivance would be of no consequence, it is accordingly omitted, or at least is scarcely observable. So judicious, so wise, and perfectly applicable, are all the dispositions of the Creator."

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THE WHITE OWL.

The WHITE OWL, SNOWY OWL, or ERMINE OWL, *S. harfang*, or *S. nyctea* of Latham, is the *Wapohoo* of the Cree Indians and the *Ookpeeguak* of the Esquimaux. The head is small in proportion; bill black, entirely hidden by the hairy feathers at its base; plumage snow-white, but more or less variegated with transverse brown spots or stripes; the younger the bird is, the larger and more numerous are these stripes; very old individuals are pure white, without any brown spots; iris fine orange yellow; feet very well covered, so as to look almost woolly to the claws; tail rounded, not much exceeding in length the extremity of the wings; length twenty-four or twenty-five inches; female considerably larger than the male; young at the time of departure from the nest covered with brown down; the first feathers bright down. It is found in the Arctic regions of the Old and New World, Iceland, Sweden, Norway, Lapland, and the north of Europe generally. The author just quoted says:

"This great northern hunter inhabits the coldest and most dreary regions of the northern hemisphere on both continents. The forlorn mountains of Greenland, covered with eternal ice and snows, where, for nearly half the year the silence of death and desolation might almost be expected to reign, furnish food and shelter to this hardy adventurer, whence he is only driven by the extreme severity of weather toward the sea-shore. He is found in Lapland, Norway, and the country near Hudson's Bay, during the whole year; is said to be common in Siberia, and numerous in Kamtschatka. He is often seen in Canada and the northern districts of the United States, and sometimes extends his visits to the borders of Florida. Nature, ever provident, has so effectually secured this bird from the attacks of cold, that not even a point is left exposed. The bill is almost completely hid among a mass of feathers that cover the face; the legs are clothed with such an exuberance of long, thick, hair-like plumage, as to appear nearly as large as those of a middle-sized dog, nothing being visible but the claws, which are large, black, much hooked, and extremely sharp. The whole plumage below the surface is of the most exquisitely soft, warm, and elastic kind, and so closely matted together as to make it a difficult matter to penetrate to the skin.

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ATHENE CONNEVIENS, AUSTRALIA.



ATHENE MACULATA, AUSTRALIA.

"The usual food of this species consists of hares, grouse, rabbits, ducks, mice, and even carrion. Unlike most of his tribe, he hunts by day as well as by twilight, and is particularly fond of frequenting the shores and banks of shallow rivers, over the surface of which he slowly sails, or sits on a rock a little raised above the water, watching for fish. These he seizes with a sudden and instantaneous stroke of the foot, seldom missing his aim. In the more southern and thickly-settled parts he is seldom seen, and when he appears, his size, color, and singular aspect attract general notice."

Genus ATHENE: *Athene*—*Chevêche* of Le Maout.—The term *Athene*, being one of the names of Minerva, the Greek goddess of wisdom, is adopted because the owl, from his meditative air and mysterious habits, was popularly supposed to penetrate the future and be possessed of superhuman knowledge, whence he was sacred to Minerva, and was called the Bird of Wisdom. The birds of this genus are without ear-tufts; the facial disk is incomplete; the bill is short; the tail short and square. The name of *Bird-Owls* is sometimes applied to the species: these are very numerous, probably forty in number, distributed in all parts of the world.

The LITTLE OWL OF EUROPE—the *Petite Chouette* of the French, *A. noctua* of C. Bonaparte—is a small species of the size of a thrush; its plumage is diversified with black and white; it avoids woods, and inhabits old walls and ruinous edifices. It is not wholly nocturnal, but hunts even before and after the twilight. It feeds on small birds, mice, moles, and insects. Its cry is *poupou, poupou*, and sometimes *aimé, hemé, edmé*. It makes its nest in old walls, in the roofs of houses, and the crevices of rocks. When taken young it can be easily domesticated, and becomes a very amusing pet. M. Gerard gives a highly interesting account of one that slept with a young cat and went about the fields hunting with it. It was also very loving and familiar with a tame crow. It hunted insects by itself in the garden, and destroyed a prodigious number.

The ACADIAN OWL or SPARROW-OWL—called *Saw-whet* in Massachusetts—*A. passerina*, is one of the least of its genus, but, like many other little folks, makes up in neatness of general form and appearance for deficiency of size, and is, perhaps, the most shapely of all our owls. Nor are the colors and markings of its plumage inferior in simplicity and effect to most others. It also possesses an eye fully equal in spirit and brilliancy to the best of them. It is a general and constant inhabitant of the Middle and Northern States, but is most numerous in the neighborhood of the sea-shore, and among woods and swamps of pine-trees. It rarely rambles much during the day; but if disturbed, flies a short way, and again takes shelter from the light; at the

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approach of twilight it is all life and activity, being a noted and dexterous mouse-catcher. It is found as far north as Nova Scotia, and even Hudson's Bay; is frequent in Russia, and is more or less common throughout Northern and Middle Europe. In this country it builds its nest generally in pines, half way up the tree, and lays two eggs, which, like those of the rest of its genus, are white. The melancholy and gloomy umbrage of those solitary evergreens forms its favorite haunts, where it sits dozing and slumbering all day, lulled by the roar of the neighboring ocean. It is seven inches and a half long, and eighteen inches in spread of wing; the upper parts are a plain brown-olive; the lower parts streaked with yellow and reddish-bay.

The EARTH OWL—the *Urucuru* of Azara—*A. cunicularia*, is brown above and white beneath; the feet are garnished with tubercles; the length is nine inches; it inhabits the hot as well as the temperate parts of South America down to latitude 42° south. It resembles the *Burrowing Owl* of the United States, and appears to have been confounded with it. It takes possession of the vacant burrows of armadillos, vischacas, and foxes, sometimes even driving out the lawful proprietors by entering the premises, and by its intolerable odor forcing them to quit. These birds live in pairs, and when disturbed utter a prolonged cry of *tchii*, *tchii*, *tchii*. They live on mice, Guinea pigs, reptiles, and insects.

The SOCIABLE BURROWING OWL, *A. socialis*—*A. hypugæa* of C. Bonaparte—is nine or ten inches long, and has a moderate-sized head; the entire upper parts are a light yellowish-brown, every feather more or less spotted with white; under parts white, with transverse bands of reddish-brown. This curious species lives in large communities in various localities east and west of the Rocky Mountains, in the United States, particularly in Oregon, California, and on the Platte River, in Nebraska, Arkansas, Texas, and New Mexico. The most remarkable feature in its history is its association with the prairie marmots, of which we have given an account at page 362.

Among the other species of this abundant genus are the BRAMAH OWL, *A. Brama*, found in India; the CHESTNUT-COLORED OWL, *A. castanoptera*, of Java; the NAKED-FOOTED ATHENE, *A. nudipes*, of the island of Porto Rico; the COLLARED OWL, *A. torquata*, and the CABOURÉ OWL, *A. pumila*, both of South America. There are several Australian species.

Genus BUBO: *Bubo.*—This includes the largest and most remarkable species of owls, as well in Europe as America, and which stand at the head of several genera of what are called *Horned Owls*, the latter name derived from the ear-tufts, which are prominent, and have a resemblance to the ears of a cat. The general form of the present genus is robust, head large, eyes large, wings long and wide, tail moderate, claws strong and curved.

The EAGLE-OWL or GREAT-EARED OWL—the *Hibou Grand Duc* of the French—*B. maximus*, is a transatlantic species, being common in Lapland, Sweden, Denmark, and Norway, and rare in England, France, and Italy. It is also met with in Northern Asia, and as far south as Smyrna. The head is ornamented with two tufts of feathers, black in the center and red at the edges; the body above is of a yellowish-red, varied with gray and black; below it is of a light red, with brown spots; the length of the body is two feet. It lives on hares, rabbits, moles, mice, rats, partridges, and reptiles. Its loud hoot, *huchou*, *houhou*, *bouhou*, *pouhou*, in the silence of night, is very startling. It makes its nest in the crevices of rocks and remote ruinous buildings, where it lays two eggs of pure white. Like all the owls, this species is an object of antipathy to other species of birds, many of which harass it by their bills and their clamor, if it is so imprudent as to wander forth in the daytime.

As an illustration of the attachment of these owls to their young, the following anecdote is related by a Swedish gentleman, who resided several years on a farm near a steep mountain, in the summit of which two eagle-owls had built their nest: "One day, in the month of July, a young bird, having quitted the nest, was caught by the servants. The bird was, considering the season of the year, well feathered; but the down appeared here and there between these feathers, which had not yet attained their full growth. After it was caught it was shut up in a large hen-coop, when, to his surprise, on the following morning, a fine young partridge was found lying dead before the door of the coop. It was immediately concluded that this provision had been brought there by the old owls, which had no doubt been making search during the night for their lost young one. And such was indeed the fact, for night after night, for fourteen days, was this same

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THE EAGLE OWL.

mark of affection repeated. The game which the old ones carried to it consisted chiefly of young partridges newly killed, but sometimes a little spoiled. On one occasion a moor-fowl was brought so fresh that it was actually warm under the wings, and at another time a putrid lamb was deposited."

The GREAT HORNED OWL, or CAT-OWL, *B. Virginianus*, (see engraving, page 64,) is two feet long; the horns three inches, consisting of thirteen or fourteen feathers; the eyes golden yellow; upper parts dusky, finely penciled on a tawny and whitish ground; beneath, elegantly marked with transverse bands of brown on a bright tawny ground, mixed with white. It is found in almost every part of the United States, but is becoming scarce in thickly-settled regions. "His favorite residence," says Wilson, "is in the dark solitudes of deep swamps, covered with a growth of gigantic timber; and here, as soon as evening draws on, and mankind retire to rest, he sends forth such sounds as seem scarcely to belong to this world, startling the solitary pilgrim as he slumbers by his forest fire,

"Making night hideous."

Along the mountainous shores of the Ohio, and amid the deep forests of Indiana, alone and reposing in the woods, this ghostly watchman has frequently warned me of the approach of morning, and amused me with his singular exclamations, sometimes sweeping down and around my fire, uttering a loud and sudden *Waugh O! Waugh O!* sufficient to have alarmed a whole garrison. He has other nocturnal solos, no less melodious, one of which very strikingly resembles the half-suppressed screams of a person suffocating or throttled, and cannot fail of being exceedingly entertaining to a lonely, benighted traveler, in the midst of an Indian wilderness!

"This species inhabits the country round Hudson's Bay, and extends even to the arctic regions, where it is often found white. It has also been seen white in the United States; but this has doubtless been owing to disease or natural defect, and not to climate. It preys on young rabbits, squirrels, rats, mice, partridges, and small birds of various kinds. It has been often known to prowl about the farm-house, and carry off chickens from roost. A very large one, wing-broken

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while on a foraging excursion of this kind, was kept about the house for several days, and at length disappeared, no one knew how. Almost every day after this, hens and chickens also disappeared, one by one, in an unaccountable manner, till, in eight or ten days, very few were left remaining. The fox, the mink, and the weasel, were alternately the reputed authors of this mischief, until one morning, the old lady herself, rising before day to bake, in passing toward the oven, surprised her late prisoner, the owl, regaling himself on the body of a newly-killed hen! The thief instantly made for his hole under the house, from whence the enraged matron soon dislodged him with the brush-handle, and without mercy dispatched him. In this snug retreat were found the greater part of the feathers, and many large fragments, of her whole family of chickens.

"There is something in the character of the owl so recluse, solitary, and mysterious; something so discordant in the tones of its voice, heard only amid the silence and gloom of night, and in the most lonely and sequestered situations, as to have strongly impressed the minds of mankind in general with sensations of awe and abhorrence of the whole tribe. The poets have indulged freely in this general prejudice, and in their descriptions and delineations of midnight storms, and gloomy scenes of nature, the owl is generally introduced to heighten the horror of the picture. Ignorance and superstition, in all ages and in all countries, listen to the voice of the owl, and even contemplate its physiognomy with feelings of disgust, and a kind of fearful awe. The priests or conjurers, among some of our Indian nations, have taken advantage of the reverential horror for this bird, and have adopted the *Great Horned Owl*, the subject of the present account, as the symbol or emblem of their office.

"Nothing is a more effectual cure for superstition than a knowledge of the general laws and productions of nature; nor more forcibly leads our reflections to the first, great, self-existent CAUSE of all, to whom our reverential awe is then humbly devoted, and not to any of his dependent creatures. With all the gloomy habits and ungracious tones of the owl, there is nothing in this bird supernatural or mysterious, or more than that of a simple bird of prey, formed for feeding by night and reposing by day."

Mr. Cassin regards the following as varieties of the preceding, or very closely allied species: *B. Atlanticus*, *B. Pacificus*, *B. Arcticus*, *B. Magellanicus*.

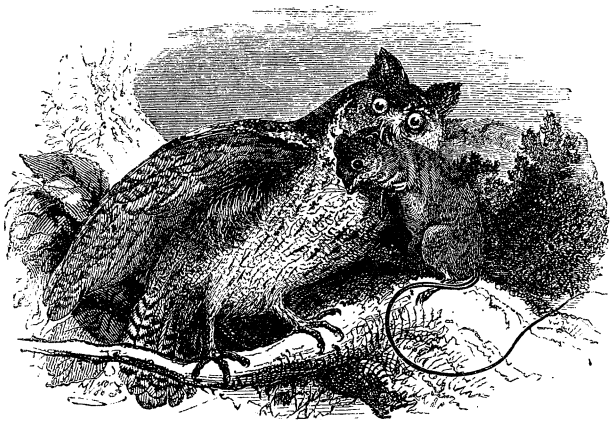
The EASTERN HORNED OWL, *B. Orientalis*, is found in Java and Sumatra.

Genus SCOPS: *Scops*.—The birds of this genus are marked with horns or ears, and resemble the preceding, but are much smaller; the European SCOPS-EARED OWL, *S. Europœus*—*Petit-Duc* of the French—is of the size of a thrush, its colors being ash and fawn, beautifully mottled with black, gray, and white. It is common in Central and Southern Europe, and feeds on insects and small quadrupeds. It is capable of domestication, and becomes very familiar. It is migratory, arriving in Europe in the spring and departing in September; it spends the winter in Africa and Asia.

The SCREECH-OWL, RED OWL, MOTTLED OWL, *S. asio*, is one of the most common species in the United States, and inhabits the whole of North America; its head is proportionally large; the ear-tufts prominent; the plumage above ashy-brown, the feathers lined with dark brown; under parts ash-white, lined with brownish-black; the length nine or ten inches. The solemn stare of this bird contrasts ludicrously with its small size. Wilson says: "This nocturnal wanderer is well known by its common name, the *Little Screech-Owl*, and noted for its melancholy, quivering kind of wailing in the evenings, particularly toward the latter part of summer and autumn, near the farm-house. On clear moonlight nights, they answer each other from various parts of the fields or orchard; roost during the day in thick evergreens, such as cedar, pine, or juniper trees, and are rarely seen abroad in sunshine. In May they construct their nest in the hollow of a tree, often in the orchard in an old apple-tree; the nest is composed of some hay and a few feathers; the eggs are four, pure white, and nearly round. The young are at first covered with a whitish down.

"I kept one of this species for several weeks in the room beside me. It was caught in a barn, where it had taken up its lodging, probably for the greater convenience of mousing; and, being unhurt, I had an opportunity of remarking its manners. At first it struck itself so forcibly against

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THE SCOPS-EARED OWL.

the window as frequently to deprive it, seemingly, of all sensation for several minutes; this was done so repeatedly that I began to fear that either the glass or the owl's skull must give way. In a few days, however, it either began to comprehend something of the matter, or to take disgust at the glass, for it never repeated its attempts, and soon became quite tame and familiar. Those who have seen this bird only in the day can form but an imperfect idea of its activity, and even sprightliness, in its proper season of exercise. Throughout the day it was all stillness and gravity—its eyelids half shut, its neck contracted, and its head shrunk, seemingly, into its body; but scarcely was the sun set, and twilight began to approach, when its eyes became full and sparkling, like two living globes of fire; it crouched on its perch, reconnoitered every object around with looks of eager fierceness; alighted and fed; stood on the meat with clenched talons, while it tore it in morsels with its bill; flew round the room with the silence of thought, and perching, moaned out its melancholy notes, with many lively gesticulations, not at all accordant with the pitiful tone of its ditty, which reminded one of the shivering moanings of a half-frozen puppy. This species is found generally over the United States, and is not migratory."

The Western Mottled Owl, *S. McCallii*, according to Cassin is a newly observed species, seven and a half inches long, found in Texas and Northern Mexico. It resembles the preceding, but is smaller.

Genus ASCALAPHIA: *Ascalaphia.*—This includes the Great Short-eared Owl of Europe, *Strix Ascalaphus* of Vieillot; its length is fourteen inches; its plumage of a whitish-red of various shades, with tints and rays of a brownish-black; on the wings and beneath the body it is marked with large zigzag bands and blotches of the same colors, finely barred on the general ground. Its range is from Italy to Egypt, being common in the latter country. Its generic as well as specific name is derived from the mythological story of the unhappy youth who saw Proserpine eat some portion of a pomegranate, and testifying to the fact, doomed her to a perpetual exile in the infernal regions; in return, the vengeful queen transformed him into an owl.

Genus CICCABA: *Ciccaba.*—This includes the Huhul, *C. huhula* of Wagler, and *Strix lineata* of Shaw, a beautiful species, found in Guiana, where it is called the *Day Owl.*

Genus PHODILUS: *Phodilus.*—This term signifies *Afraid of the light*, and characterizes the typical species, the Kalong Owl, *P. badius—Strix badia* of Horsfield, found in Java.

Genus EPHIALTES: *Ephialtes*, includes the White-cheeked Owl, *E. leucotis* of C. Bonaparte, found in Senegal.

Genus NYCTAETUS: *Nyctaetus*, includes the Milk Owl, *N. lacteus*, of the size of the eagle-owl, and found in Senegal.

Genus KETUPU: *Ketupa.*—This term means *Night-Eagle*, and is applied to the species, Blo-Ketupu, its popular name in Java, where it is found. It is the *K. Javanensis* of Lesson, and *Strix ketupa* of Horsfield.

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THE GREAT SHORT-EARED OWL.

Genus SYRNIUM: *Syrnium.*—This term means *Birds of Night*, and the genus includes several species, called *Chats-Huant* or *Hooting-Cats* by the French.

The HULOTTE or WOOD-OWL, *S. aluco*, is somewhat larger than the common European owl, but has similar manners and habits. It is found in the great forests of Europe, where it feeds on squirrels, bats, mice, &c.

The BARRED OWL, CANADA OWL, or CLOUDED OWL, *S. nebulosum*, is very common in the United States, especially about the region of Pennsylvania. It is sixteen or seventeen inches long, of a pale brown above, marked with transverse spots of white; head large, and mottled with brown and white; the under parts streaked with brown on a yellowish ground. It feeds on mice and small quadrupeds, though it occasionally catches a fowl or a young rabbit. It is frequently seen flying by day, and is then harassed by various kinds of birds. Its hoot of *Waugh! Waugh!* at night, in the thick forests, is doleful in the extreme.

The OURAL OWL, *S. Uralense*, is a large species, twenty-one inches long, and inhabits the north of Europe and Asia.

The GREAT GRAY OWL, or CINEREOUS OWL, *S. cinereum*, is a large species, found in the northern parts of both continents; its upper parts are smoky brown, nearly every feather more or less mottled with ashy-white; under parts smoky brown, also mottled with ashy-white. The length is twenty-six inches. It is the largest species of owl known in the United States. It is found rarely in New England, breeds in Canada, Wisconsin, and Oregon, and is met with all across the continent farther north.

The PAGODA OWL, *S. pagodarum*, is an East India species, seventeen inches long, vulgarly called *Oumé-Kolan.*

Genus NYCTALE: *Nyctale.*—This, whose name signifies *Lovers of darkness*, includes a single American species, TENGMALM'S OWL, *N. Tengmalmi*, ten and a half inches long, and found in the northern parts of our continent.

The WHITE-FRONTED OWL or KIRTLAND'S OWL, *N. albifrons*, resembles the Acadian Owl, and has been regarded by some as identical with it. It is eight inches long, and is found in Canada.

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Genus OTUS: *Otus.*—This includes several species, marked by movable ear-tufts. The LONG EARED OWL OF EUROPE—*Hibou* of the French; *Hibou Moyen Duc* of Temminck—is fourteen or fifteen inches long, and feeds on small quadrupeds, as rats, moles, mice, and small birds. Its general color above is light brown, marked with streaks of blackish-brown; beneath, mixed grayish white and pale brown, streaked with umber. It is common in England, France, and throughout all Europe.

The AMERICAN LONG-EARED OWL, *O. Wilsonianus*, resembles the preceding, and has been regarded as the same species, but it is somewhat larger and darker colored, and is doubtless distinct. It is one of the commonest owls of the Northern and Eastern States, breeds in Pennsylvania, and is found as far north as Hudson's Bay.

The SHORT-EARED OWL, *O. brachyotus*, is fourteen inches long, and is distinguished by a small head; it feeds on small quadrupeds and small birds, and being migratory in England, coming from the north in October, is called the *Woodcock Owl.*

The AMERICAN SHORT-EARED OWL, or MARSH OWL, *Strix brachyotus* of Forster, is like the preceding, and has been regarded as the same species; Cassin thinks, however, that it is larger and darker colored, and that it is probably distinct. It is common throughout Northern America, being migratory in the United States, as is the case with the American Long-eared Owl, coming from the north in November and departing in the spring.

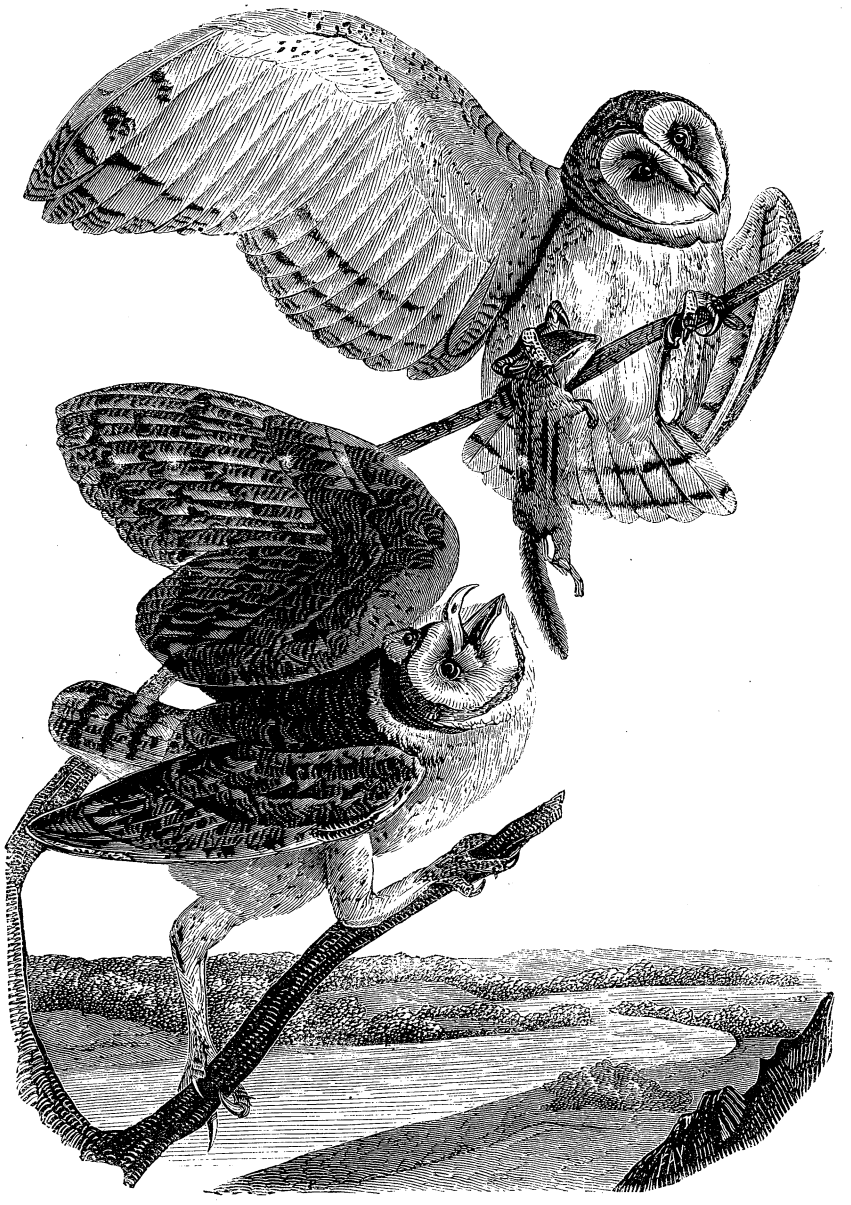
Genus STRIX: *Strix.*—This includes the EUROPEAN BARN-OWL, *S. flammea*, which may be considered as the type of the genus *Strix*, which embraces the true owls; it is the *Effraie* and *Petit Chat-huant Plombé* of the French; *Barbagianni*, *Alloco Commune e Bianco* of the Italians; *Schleierkauz*, *Perlschleierkautz*, and *Perl-Eule* of the Germans; *Barn-Owl*, *White Owl*, *Church-Owl*, *Gillihowlet*, *Howlet*, *Madge-Howlet*, *Madge-Owl*, *Hissing-Owl*, and *Screech-Owl* of the English; and *Dylluan Wen* of the Welsh. The upper parts are bright yellowish, varied with gray and brown zigzag lines, and sprinkled with a multitude of small whitish dots; face and throat white; lower parts in some individuals rusty white, sprinkled with small brown dots; in others bright white, marked with small brownish points; in others again without the slightest appearance of spots; feet and toes covered with a very short down, more scanty on the toes; iris yellow; length about thirteen inches. There are varieties, some whitish and some entirely white. It is common in most parts of Europe.

Montagu says that this species is never known to hoot. Mr. Yarrell states that it screeches, but does not generally hoot. Sir W. Jardine declares that he shot one in the act of hooting, and that at night, when not alarmed, hooting is its general cry. It hisses, and, like other owls when annoyed or frightened, snaps its bill loudly. It was said to snore, but this sound is now regarded as the grumbling of the young ones when hungry. Rats, mice, shrews, young birds, and beetles form their food, and the mice especially suffer when the White Owl has a young brood to sustain. It has been seen to catch fish. It is almost domesticated in Europe, especially in England, inhabiting even populous towns, and is particularly attached to towers, belfries, the roofs of churches, and other lofty buildings, which afford it a secure retreat. Every one will remember the fine descriptive lines of Gray, referring, no doubt, to this species—

> "—— from yonder ivy-mantled tower,
> The moping owl does to the moon complain
> Of such as, wandering near her secret bower,
> Molest her ancient, solitary reign."

Macgillivray tells us that the barn-owl chooses for his place of repose some obscure nook in an old building, the steeple of a church, a tower, a dove-cot, or a hollow tree. There he remains from sunrise to sunset, in a nearly erect posture, with retracted neck and closed eyelids, dozing away the hours in which, from the structure of his eyes, he is unable to approach his prey, and waiting for the return of twilight. If approached in this state, instead of flying off, he raises his feathers, hisses like an angry cat, clicks his bill, and thus threatens the intruder. Should he by an accident be driven abroad, he seems dazzled and bewildered. Incapable of distinctly perceiving the objects around him, he flits about with an unsteady flight, and is glad to betake himself to some dark retreat, where he may be sheltered from the light, as well as from his numerous enemies.

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THE AMERICAN BARN-OWL.

But although the barn-owl is so imbecile by day as to suffer itself to be insulted with impunity by the pettiest aggressor, it assumes a very different character when darkness restores to it the faculty of clearly distinguishing objects. By watching near its haunts, or taking one's station in the neighborhood of some farm-steading frequented by it, one may dimly see it advance with silent and gliding flight, skimming over the fields, shooting along the hedge-bank, deviating this way and that, and now perhaps sweeping overhead, without causing the slightest sound by the flappings of its downy wings. On perceiving an object, it drops to the ground, secures its prey in a moment, and uttering a shrill cry, flies off with it in its claws. In a little time it returns, and thus continues prowling about the farm-yard for hours.

The nests of this species are very rude; the eggs three or four in number; these are laid at different times, so that the hatching of the young is often several weeks apart. It is capable of

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domestication, and becomes very amusing. Waterton, the celebrated naturalist and traveler, had a large colony of these owls at his country-seat, Walton Hall, in England. They became very numerous, and were by no means shy, so that their natural history was very easily studied. Among the curious facts furnished by him in respect to this species are the following:

"When one of these birds has young, it will bring a mouse to its nest about every twelve or fifteen minutes. But in order to have a proper idea of the enormous quantity of mice which it destroys, we must examine the pellets which it ejects from its stomach in the place of its retreat. Every pellet contains from four to seven skeletons of mice. In sixteen months from the time when the apartment of the owl in the old gateway was cleaned out there has been a deposit of above a bushel of pellets." From this it appears that the barn-owl is an uncommonly good liver; it may be added, that although the farmers have generally been an enemy of this owl, it is no doubt one of their greatest benefactors.

This bird, as it appears, is not confined to Europe, but extends to Asia; it inhabits Tartary, where, according to Pennant, "the Moguls and natives almost pay it divine honors, because they attribute to it the preservation of the founder of their empire, Genghis Khan. That prince, with his small army, happened to be surprised and put to flight by his enemies, and forced to conceal himself in a little coppice; an owl settled on the bush under which he was hid, and induced his pursuers not to search there, as they thought it impossible that any man could be concealed in a place where that bird would perch. Thenceforth they held it to be sacred, and every one wore a plume of the feathers of this species on his head. To this day the Kalmucs continue the custom on all great festivals, and some tribes have an idol in the form of an owl, to which they fasten the real legs of one."

The American Barn-Owl, *S. Americana*, was long considered as identical with the preceding, but though it resembles it, it is larger, measuring sixteen inches. It is found throughout the United States—very sparingly in New England and the Middle States, but being more abundant in the South and West; it is also found in Mexico and Canada. It is less accustomed to dwell in the vicinity of towns and villages than the barn-owl of Europe, and instead of making its retreat in churches and ruins, it lives chiefly in old trees. In other respects it is exceedingly like the European bird we have just described.

The Pigmy Owl, *S. infuscata*, is the smallest North American species known, being but six and a half inches long: found in Oregon and California.

The Boobook or Buck-Buck, *S. bookbook* of Latham, is an Australian species, which may be heard nearly every night during winter, uttering a cry corresponding with that word. Although this note is known to every one, the bird itself is known but to few, and it has cost naturalists considerable time and trouble before they could satisfy themselves respecting its identity. The cry of the bird is somewhat similar to that of the European cuckoo, and the colonists have hence given it that name. The lower order of the settlers in New South Wales are led away by the idea that every thing is the reverse in that country of what it is in England, and the cuckoo, as they call this bird, singing by night, is one of the instances which they point out.

The Cape Owl, *S. Capensis*, is found in the regions near the Cape of Good Hope. It has been sometimes confounded with the barn-owl, which is abundant there, and is called *Doodvogel*, but it is a distinct species.

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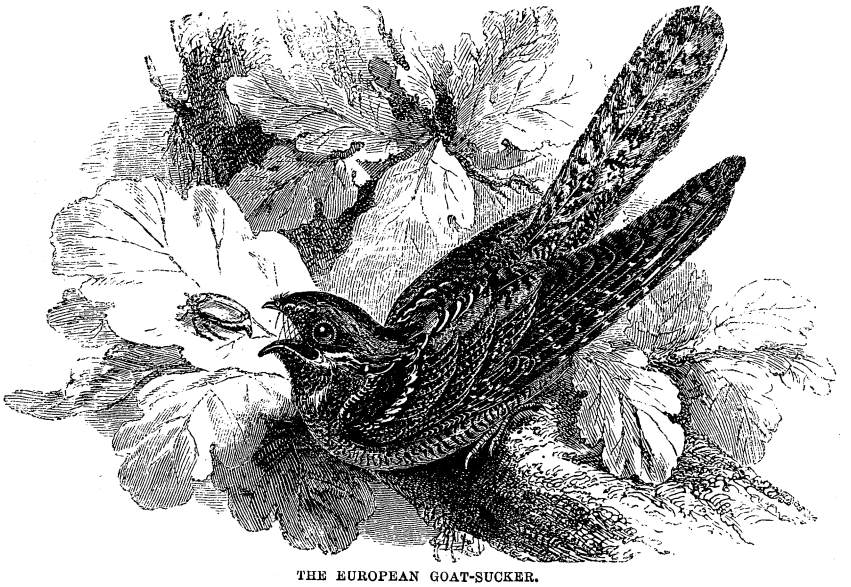


ORDER 2. **PASSERES.**

The term *Passeres* is derived from the Latin *Passer*, a *Sparrow;* its signification here is not very obvious, but it may be taken as meaning a group of birds that perch like the sparrow; in other words, the *Passeres* are *Perching-Birds*, and this order is the same as the *Insessores*—a term derived from the Latin *insessus*, and meaning *perching*—of many authors. It includes not only a great number of genera and species, but a great diversity of kinds, some very unlike others. They approach closely to the scansorial or climbing birds, which, in fact, might perhaps with propriety be united with them to form a single order, as the principal distinction consists in the structure of the feet, which in the Passeres possess four toes—three directed forward and one backward. This distinction is, however, more apparent than real, as several of the passerine birds have the power of turning one of the toes backward at pleasure; and the cuckoos can turn one of their hind toes forward. The tarsi and toes are always scutellate, and the hinder portion and sides of the former are usually covered with a single horny plate, which is also sometimes the case with the anterior surface of this part of the leg. The legs and feet are generally slight, and the claws, although curved, never constitute powerful hooked talons, as in the predaceous birds.

The power of flight is possessed in great perfection by most of these birds; the wings are large and powerful, and the crest of the sternum very well developed. The primary quill feathers of the wing are generally ten in number; but the first of these is frequently wanting, or very small The tail is usually composed of twelve quill feathers. The bill is very variable in form, sometimes elongated and slender, sometimes stout and conical, or depressed and opening with a very wide gape. The upper mandible is frequently more or less toothed near the tip. From these peculiarities in the form of the bill the primary classification of these birds most generally in use is derived, each form being characteristic of a group or sub-order. Thus the birds in which the bill is more or less depressed, with a very wide gape, are called *Fissirostres*, and feed upon insects, which they capture on the wing. Those which have the bill elongated and awl-shaped are called *Tenuirostres*, and feed upon soft larvæ and the juices of flowers; and those with a somewhat conical bill, but toothed, and usually more or less hooked at the tip, are called *Dentirostres*, and feed principally upon insects and fruits. Those with a stout conical bill, in which the upper mandible is not distinctly toothed, are called *Conirostres;* in these the bill is usually employed in crushing the hard seeds which constitute their food. The œsophagus of these birds is usually dilated into a sort of crop; the stomach forms a powerful muscular gizzard, and the intestine is furnished with two cœca, generally very small. Many of them have also a complicated muscular apparatus at the lower larynx, which enables them to produce charmingly modulated notes.

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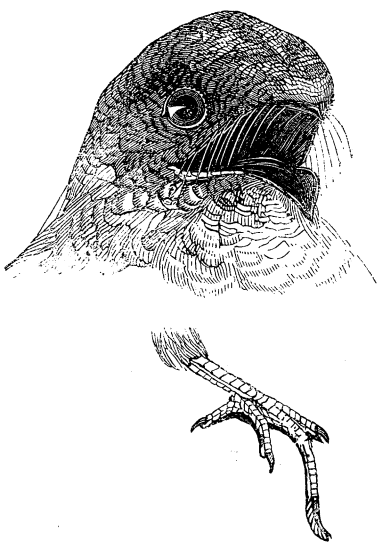
THE EUROPEAN GOAT-SUCKER.

FISSIROSTRES.

The first group of the Passerine birds, that of the *Fissirostres*, is characterized by having the gape-line continued far back, usually reaching under the eyes. They are generally insectivorous birds, and many of them take their prey on the wing; the gape is accordingly usually furnished with bristles, which, by enlarging the space occupied by the mouth, greatly facilitate the capture of insects. This group includes the *Goat-Suckers*, *Swallows*, *Motmots*, *Todies*, *Eurylaiminæ*, *Rollers*, *Trogons*, *Puff-birds*, *Kingfishers*, *Jacamars*, and *Bee-Eaters*.

THE CAPRIMULGIDÆ OR GOAT-SUCKERS.

The birds of this curious family, often called *Night-Swallows*, have some resemblance to the owls in their large heads, large eyes, and mottled covering, and also in their nocturnal or crepuscular habits and their noiseless flight. Their bill is short and weak; the tarsi are short, and frequently covered with plumes; the feet are small and weak, and hence these birds, instead of sitting across the perch and grasping it with their feet, sit lengthwise upon it. The middle toe is very long, and the claw is pectinated, or toothed like a comb. The use of this has been a matter of dispute: some say that it serves to hold fast beetles and other slippery insects, and others that it is employed to comb the birds' whiskers. They live upon moths, beetles, and other insects, which they generally pursue during the twilight, sometimes well into the night, their large visual organs collecting sufficient light for them to perceive their minute prey long after it is invisible to the eye of man. The enormous gape of their mouths, aided by bristles springing from each side of the upper mandible, furnishes a capacious trap for securing their game. The form and extent of the mouth are so extraordinary, that ages ago the people of Greece and Italy,



HEAD AND FOOT OF THE GOAT-SUCKER.

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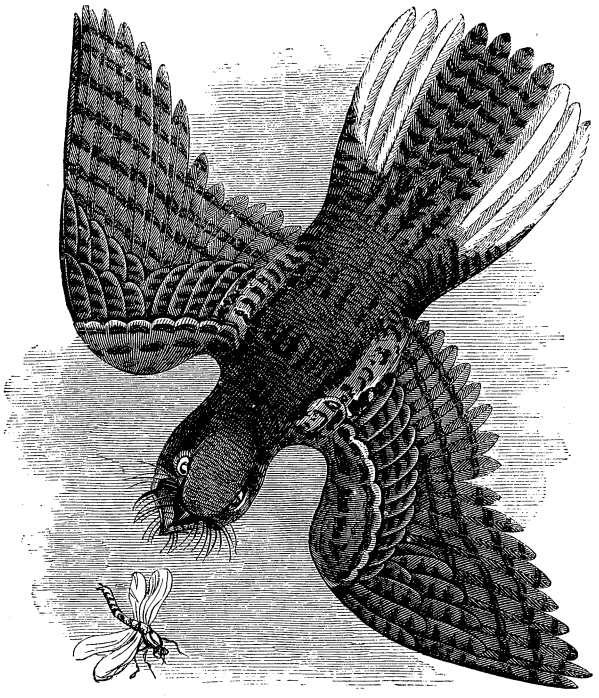
seeing these birds flying around the goats among the hills and rocks at nightfall, fancied that they sucked their milk, and hence their popular name. Even the learned and philosophic Aristotle partook of this prejudice. In his Natural History he says: "The bird called *Ægothelas* is a mountain bird, a little smaller than the cuckoo. It lays two or three eggs, and is of a slothful nature; flying upon the goats, it sucks them; they say when it has sucked the teat it becomes dry, and the goat becomes blind." This superstition continued with many people almost to our own time. It is scarcely necessary to say that it is one of the thousand idle and mischievous inventions which have sprung up in the long darkness of ignorance, but which modern science has dissipated. In the United States, few of these popular superstitions have prevailed, because they mostly originated in foreign countries long previous to the settlement of America, and because, also, the founders of society here were mostly enlightened people, little likely either to entertain or perpetuate traditions and legends contradicted by their own observation and experience. It is a noticeable fact, that while among the rural populations of England, Scotland, Ireland, France, Spain, Italy, Germany, &c., a great variety of popular superstitions are in vogue even to the present day, in respect to bees, birds, cattle, cats, dogs, &c., they either never existed among our native population, or are now almost entirely repudiated.

Genus CAPRIMULGUS: *Caprimulgus.*—This includes the COMMON EUROPEAN GOAT-SUCKER, *C. Europæus*—the *Calcabotto Piattaglione*, *Porta Quaylie*, and *Cova-Terra* of the Italians; *Tette-Chèvre*, *Engoulevent Ordinaire*, and *Crapaud Volant* of the French; *Milchsauger*, *Geissmilcher*, *Nacht Rabe*, *Nacht Schwalbe*, and *Tag-Schlafer* of the Germans; and *Goat-Sucker*, *Night-Jar*, *Jar-Owl*, *Churn-Owl*, *Fern-Owl*, *Dor-Hawk*, *Night-Hawk*, and *Wheel-Bird* of the English. Its color above is ashy-gray, thickly streaked and spotted with yellowish-brown; beneath yellowish-brown; length ten inches. It feeds on insects, flies, moths, and beetles. Its powers of flight are wonderful, exceeding even those of the swallows; the jarring sound, which gives name to the bird, is uttered sometimes while flying, but usually when it is at rest; it seems to be produced in the same manner as the purring of a cat, and resembles it, though much louder. One of them, emitting this sound while sitting on the cross of a small church, communicated a sensible vibration to the whole building. It appears that goat-sucking is not the only crime laid to this bird. White, of Selborn, informs us that "the country-people have a notion that the fern-owl, or churn-owl, or eve-jar, which they also call a *Puckeridge*, is very injurious to weanling calves, by inflicting, as it strikes at them, the fatal distemper known to cow-leeches by the name of *puckeridge*. Thus does this harmless, ill-fated bird fall under a double imputation, which it by no means deserves: in Italy, of sucking the teats of goats, whence it is called the *Caprimulgus*, and with us, of communicating a deadly disorder to the cattle. But the truth of the matter is, the malady is occasioned by a dipterous insect, which lays its eggs along the chines of kine, where the maggots, when hatched, eat their way through the hide of the beast into the flesh, and grow to a very large size." This bird is generally known throughout Europe, but is most abundant in the south. It is migratory, spending the winter in Asia and Africa.

The *C. ruficollis* is a North African species, sometimes found in Spain, where it is called *Samala*.

Genus ANTROSTOMUS: *Antrostomus.*—This includes several well-known American species, among which is the WHIPPOORWILL—*C. vociferus* of Wilson—*A. vociferus:* it is about ten inches long, and is covered with feathers sprinkled and mottled with brown, red, black, and white; the tail with zigzag and herring-bone figures of black; across the throat is a band of whitish; the breast black, powdered with ferruginous; the belly of a lighter shade; the bristles on the cheek longer than the bill; tail rounded. Though comparatively few persons have ever seen this bird, it is almost universally known by its cry throughout the rural districts of the United States. It is migratory, arriving in the Middle States and New England in May; its song is now heard soon after sunset, at first faintly and remotely, in the deep forests, but in a few evenings it grows familiar, and issues from a neighboring copse, or the trees in the garden, or perhaps from the roof of the house. The bird is now a regular acquaintance. Every morning and evening his shrill and rapid repetitions are heard from the adjoining woods, and when two or more are calling out at the same time, as is often the case in the pairing season, and at no great distance from each other,

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THE WHIPPOORWILL.

the noise, mingling with the echoes from the hills, is really surprising. Strangers, in parts of the country where these birds are numerous, find it almost impossible for some time to sleep; while to those long acquainted with them, the sound often serves as a lullaby to assist their repose.

These notes seem pretty plainly to articulate the words which have been generally applied to them, *whip-poor-will*, the first and last syllables being uttered with great emphasis, and the whole in about two seconds to each repetition; but when two or more males meet, their whip-poor-will altercations become much more rapid and incessant, as if each was straining to overpower or silence the other. When near, you often hear an introductory cluck between the notes. At these times, as well as at almost all others, they fly low, not more than a few feet from the surface; sometimes they are seen skimming about the house and before the door, alighting on the wood-pile, or settling on the roof. Toward midnight they generally become silent, unless in clear moonlight, when they are heard with little intermission till morning. If there be a creek near, with high, precipitous, bushy banks, they are sure to be found in such situations. During the day they sit in the most retired, solitary, and deep-shaded parts of the woods, generally on high ground, where they repose in silence. When disturbed, they rise within a few feet, sail low and slowly through the woods for thirty or forty yards, and generally settle on a low branch or on the ground. Their sight appears deficient, except at night. They are rarely shot at or molested, and from being thus transiently seen in the obscurity of dusk, or in the deep umbrage of the woods, their particular markings of plumage are so little known that they have been confounded with the Night-Hawk, which they resemble in general appearance. The female begins to lay about the second week in May, selecting for this purpose the most unfrequented part of the wood, often where some brush, old logs, heaps of leaves, &c., have been lying, and always in a dry situation. The eggs are deposited on the ground, or on the leaves, not the slightest appearance of a nest being visible. They are usually two in number. The young ones have the appearance of crumpled leaves or heaps of dirt, and easily escape observation. This species is found throughout eastern North America from Canada to Florida, and also in Cuba.

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THE CHUCK-WILL'S-WIDOW.

The CHUCK-WILL'S-WIDOW, *A. Carolinensis*, is about twelve inches long; general form robust entire body dark brown, minutely dotted with reddish-fulvous, and every feather having longitudinal stripes of black. Its eggs, usually two in number, are laid on the ground, generally in the woods. It is common in the Southern and Southwestern States, and is the largest of the genus in America. Flying low, and skimming a few feet above the surface of the ground, it settles on logs and fences, from which it pursues the flying moths and insects on which it feeds; sometimes sailing nearer the earth, it alights to pick up a beetle, or flutters round the trunk of a tree in search of any insect that may be crawling on the bark. Like the species above described, it commences its singular serenade of *Chuck-Will's-Widow* in the evening, soon after sunset, continuing the cry, with short interruptions, for several hours, and renewing it toward morning till the opening dawn. The tones are slower, louder, and more full than those of the whippoorwill, and may be heard on a still evening for half a mile. The species is particularly numerous in the vast forests of the Mississippi, where, throughout the evening, its echoing notes are heard in the solitary glens, and from the surrounding and silent hills, becoming almost incessant during the shining of the moon. In rainy and gloomy weather these birds remain silent in the hollow log which affords them and the bats a common roost and refuge by day. When discovered in this situation they ruffle their feathers, open their enormous mouths, and utter a murmur, almost like the hissing of a snake, to intimidate the intruder. The Indians have many superstitions in relation both to this bird and the whippoorwill.

NUTTALL'S WHIPPOORWILL, *A. Nuttallii*, is seven inches long, and is found in western North America. Its habits are not particularly known.

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THE FORK-TAILED PSALURUS.



THE NIGHT-HAWK.

Genus PSALURUS: *Psalurus.*—This includes a very extraordinary South American species, *P. macropterus:* it has a bright, ruddy demi-collar ornamenting the back part of the neck; the tail is excessively long, and deeply forked; the two external tail-feathers in the male are much longer than the others. It is a native of Paraguay and Brazil.

Genus CHORDEILES: *Chordeiles.*—This includes several American species, one of which is the Pisk or Night-Hawk, *C. Virginianus*, familiarly known in all the United States, in Mexico, and the West Indies. It is nine to ten inches long; upper parts brownish-black, variously mottled; a conspicuous white transverse bar on each wing, above and below; when the bird is seen flying over, this appears like a large circular spot; tail-feathers brownish-black, banded with ashy-white. The Night-Hawks usually arrive from the south in May. The eggs, two in number, are laid on the ground, sometimes in the woods, often in a corn-field. As soon as incubation commences, the male keeps a most vigilant watch. He is then more frequently seen playing about in the air over the place, even during the day, mounting by several quick vibrations of the wings, then a few slower, uttering all the while a sharp, harsh squeak, till, having gained the

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highest point, he suddenly precipitates himself, head foremost, and with great rapidity, down sixty or eighty feet, wheeling up again as suddenly, at which instant is heard a loud, booming sound, very much resembling that produced by blowing strongly into the bung-hole of an empty hogshead; and which is doubtless produced by the sudden expansion of his capacious mouth while he passes through the air, as exhibited in the upper figure in the engraving. He again mounts by alternately quick and leisurely motions of the wings, playing about as he ascends, uttering his usual hoarse squeak till, in a few minutes, he again dives with the same impetuosity and booming sound as before. The object of this performance, which is confined to the male, is not known.

When the weather happens to be wet and gloomy, the night-hawks are seen abroad at all hours of the day, generally at a considerable height; their favorite period, however, is from two hours before sunset, until dusk. At such times they seem all vivacity, darting about in the air in every direction, making frequent short, sudden turnings, as if busily engaged in catching insects. Even in the hottest, clearest weather, they are occasionally seen abroad, squeaking at short intervals. They are also often found sitting in the highway, or along the fences, basking in the sun. Near the sea-shore, in the vicinity of extensive salt marshes, they are likewise very numerous, skimming over the meadows, in the manner of swallows, until it is so dark that the eye can no longer follow them. When wounded and taken, they attempt to intimidate you by opening their mouth to its utmost stretch, throwing the head forward, and uttering a kind of guttural, whizzing sound, striking also violently with their wings, which seem to be their only offensive weapons; for they never attempt to strike with the bill or claws. About the middle of August they begin to move off toward the south, at which season they may be seen almost every evening, from five o'clock until after sunset, passing in widely-scattered multitudes, all steering toward the south.

Other species of this genus are the *C. sapiti*, common during the summer in Texas; *C. Henryi*, found in New Mexico; *C. Brasilianus* and *C. acutipennis*, &c.

Genus SCOTORNIS: *Scotornis.*—This includes the African Long-tailed Night-Jar, *S. climaturus*, thirteen inches long, of a light brown, varied with dark freckles; common in Senegal.

Genus MACRODIPTERYX: *Macrodipteryx.*—This includes the Long-shafted Goat-Sucker or Pennant-winged Night-Jar, *M. Africanus.* This bird is mottled with brown and white, and is eight inches long; its most remarkable feature is a feather from ten to fifteen inches long, inserted in each wing, immediately between the primary and secondary quills. This feather consists of a shaft naked for two-thirds its length, and webbed for the remainder. It appears to be a mere ornament, as no use is known for so strange an appendage; it is extremely flexible, moving with the least breath of wind, and therefore offering no obstruction in flight. This species is found in Sierra Leone.

Genus PROITHERA: *Proithera.*—This includes the Day Goat-Sucker, *P. diurna*, ten inches long; of Brazil and Paraguay.

Genus PODARGUS: *Podargus.*—This includes several species: the Gold River Goat-Sucker, *P. humeralis*, is a large bird, variegated with ashy-brown and dirty yellow above; tesselated beneath with black stripes and dirty-yellow bands; length twenty inches. It has the power of shifting its outer toe backward, and captures its insect prey by creeping about on the trees; found in Australia.

The More-Pork Bird, *P. Cuvieri*, is also an Australian species, its name being derived from its cry, "*More pork! More pork!*"—loudly and distinctly uttered in rapid succession in the forests. This is considered a bird of ill omen by the colonists.

Genus NYCTIBIUS: *Nyctibius*, includes the Great Ibijau—the *Great Flying Toad* of Buffon—*N. grandis.* It is of the size of a barn-owl, its length being twelve inches; plumage brown, speckled with black; it haunts solitary places, and lives in hollow trees.

The Potoo Bird, *N. Jamaicencis*, resembles the common goat-sucker in appearance; its disposition is sedentary, it being frequently seen perched on a post or dead tree looking out for its insect prey.

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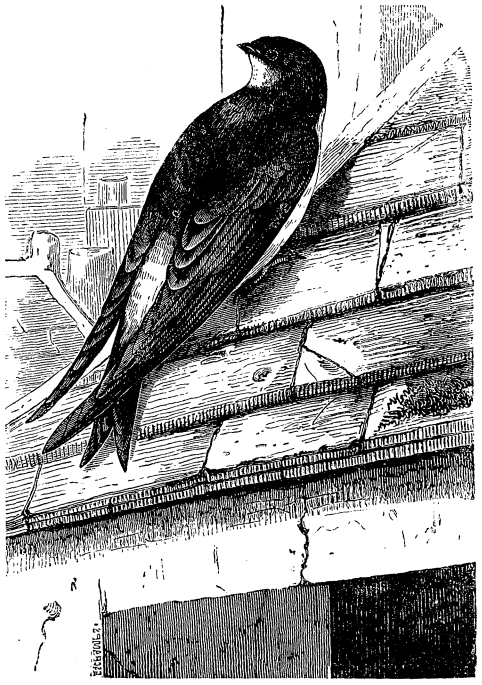
THE GOLD RIVER GOAT-SUCKER.



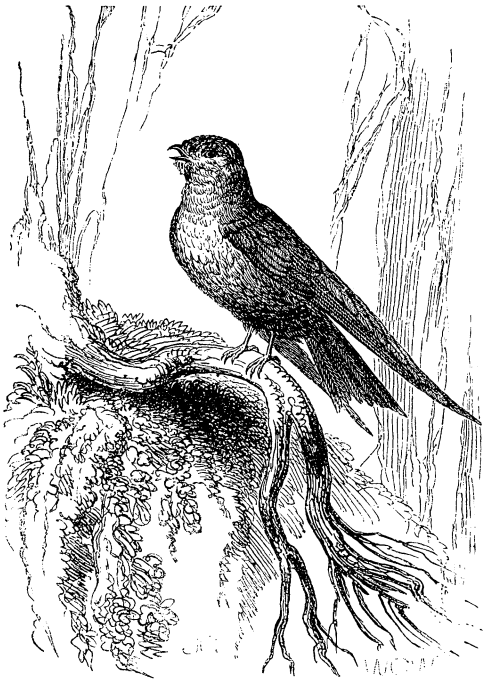
THE GREAT IBIJAU.

Genus STEATORNIS: *Steatornis.*—This includes the Oil-Bird or the Guacharo Bird, *S. caripensis.* It is about the size of a common fowl, and is strictly nocturnal in its habits, passing the day and breeding in dark caverns, from which it only issues in search of food, in the twilight. Its food, however, is very different from that of its allies: it consists of fruits and seeds; and the Indians assured Humboldt that the bird never pursues insects. The young become exceedingly fat, and at a certain season—that is, about midsummer—they are collected by the natives and boiled down for the sake of their oil, which is said to resemble olive-oil, and to be of such an excellent quality that it will keep for more than a year without becoming rancid. These birds make a horrible noise when their caverns are invaded, and as their abodes are generally regarded with a superstitious dread by the Indians—who believe that the spirits of their ancestors dwell in them—in their pursuit of the young birds for their "oil harvest," as they call it, they seldom venture far from the entrance. The principal resort of these strange birds is the cavern of Guacharo, in the valley of Caripe, in Venezuela. This cave has a grand entrance, fifteen hundred feet above the level of the sea, and extends four thousand feet into the bowels of the mountains. In the hidden apartments of this gloomy temple, these birds roost by thousands during the day, issuing forth only at night. They have been also found at Bogota, and in the islands of Guadeloupe and Trinidad.

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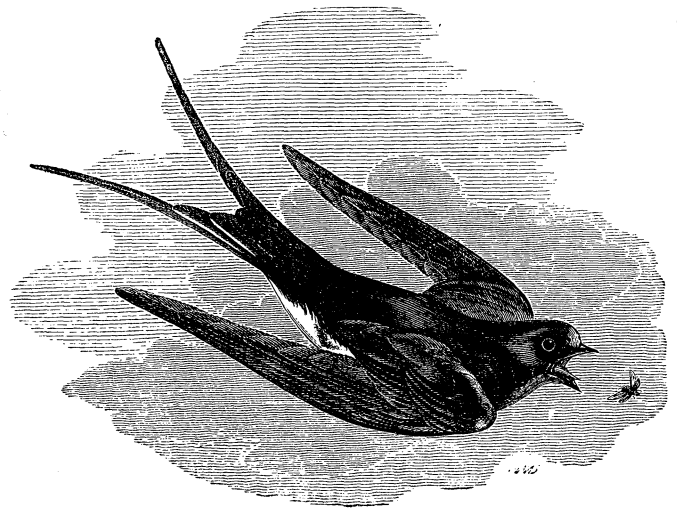
THE EUROPEAN HOUSE-MARTIN.



THE ESCULENT SWALLOW.—(See p. 91.)

THE HIRUNDINIDÆ OR SWALLOWS.

The birds of this pleasing and interesting family have a short, depressed, triangular bill, a wide gape furnished with short bristles, wings long and pointed, tail more or less forked, three toes before and one behind. They are slender and elegant of form; their flight is easy, and displays a thousand graceful evolutions in the air as they pursue their winged prey, often for hours together, sometimes rising to a great elevation, and sometimes skimming along the surface of the land, or gliding over the waters, drinking as they pass. Several of the species—which are widely distributed throughout the world—have a fondness for living in the immediate vicinity of man, even in his barn or his house; the eggs are four to six, and there are usually two broods in a season.



THE COMMON EUROPEAN SWALLOW.

Genus HIRUNDO: *Hirundo.*—This includes several species. The COMMON SWALLOW OF EUROPE, *H. rustica*, is six and a half inches long; above it is black, with violet reflections; the throat reddish-brown; the breast brown; the belly white; white and buff-colored varieties not uncommon; the tail deeply forked. It is migratory, arriving in Europe in April, and departing for Africa and Asia, where it spends the winter, the latter part of October. It builds its saucer-shaped nest of pellets of mud, moulded with straw, often in the throat of a chimney, on some angle of

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a brick or tile. Hence this bird is called *Hirondelle de Cheminée* by the French. It builds, however, in various other situations, as in the mouths of old wells and unused mines, under the roofs of barns and sheds, in belfries, sometimes in the fork of a dead tree. A few years ago a pair of them built, for two successive summers, under the sponsons of the paddle-wheels of a steam-tug at Carlisle, England, and succeeded in rearing their young, despite the daily trips of the boat. It is a pleasing and familiar bird, and may be easily tamed. It is distributed throughout Europe in summer.



NEST OF THE COMMON EUROPEAN SWALLOW.

The HOUSE-MARTIN or WINDOW-SWALLOW, *H. urbica*, is five and a half inches long; above black, with violet reflections; beneath white—white varieties being sometimes obtained; it builds its nests often near the lower cornice of windows, and beneath the eaves of granaries and stables. Like the rest of the family, it has great art in making its nests adhere to the faces of walls, and White tells us of one that built against a pane of glass. The eggs are four or five in number; there are usually two broods in a season; sometimes as many as four. This bird is intimately woven with associations of country life in England; almost every poet has celebrated it. Shakspeare says, beautifully and descriptively:

"This guest of summer,
The temple-haunting martlet, does approve,
By his loved masonry, that heaven's breath
Smells wooingly here. No jutting frieze,
Buttress, or coignes of 'vantage, but this bird
Hath made his pendent bed and procreant cradle:
Where they most breed and haunt, I have observed,
The air is delicate."

Other European species are the RUFULINE SWALLOW, *H. rufula*—called *Rousseline* in France—seven inches long, known in the south of Europe and the north of Africa; and the MOUNTAIN SWALLOW, *H. rupestris*, which builds in the crevices of rocks in the high peaks of the Alps and the Pyrenees.

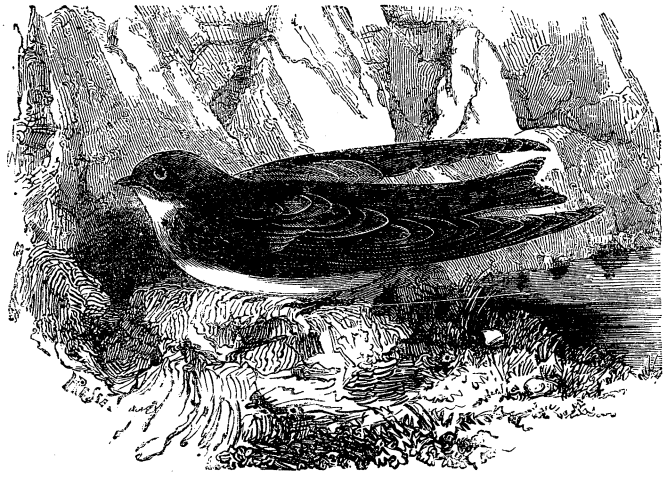
The AMERICAN BARN-SWALLOW, *H. rufa*, resembles the common swallow of Europe, being seven inches long; upper parts steel-blue, with purple and green reflections; under parts chestnut color. They arrive among us in April, and depart in October. The enthusiastic Wilson says: "There are but few persons in the United States unacquainted with this gay, innocent, and active little bird. Indeed, the whole tribe are so distinguished from the rest of small birds, by their sweeping rapidity of flight, their peculiar aerial evolutions of wing over our fields and rivers, and through our very streets, from morning to night, that the light of heaven itself, the sky, the trees, or any other common objects of nature, are not better known than the swallows. We welcome their first appearance with delight, as the faithful harbingers and companions of flowery spring and ruddy summer; and when, after a long, frost-bound, and boisterous winter, we hear it announced that 'the swallows are come,' what a train of charming ideas are associated with the simple tidings!

"The wonderful activity displayed by these birds forms a striking contrast to the slow habits of most other animals. It may be fairly questioned whether, among the whole feathered tribes which heaven has formed to adorn this part of creation, there be any that, in the same space of time, pass over an equal extent of surface with the swallow. Let a person take his stand, on a fine summer evening, by a new-mown field, meadow, or river-shore, for a short time, and, among

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the numerous individuals of this tribe that flit before him, fix his eye on a particular one, and follow, for a while, all its circuitous labyrinths—its extensive sweeps—its sudden, rapidly reiterated zigzag excursions, little inferior to the lightning itself—and then attempt, by the powers of mathematics, to calculate the length of the various lines it describes. Alas! even his omnipotent fluxions would avail him little here, and he would soon abandon the task in despair. Yet, that some definite conception may be formed of this extent, let us suppose that this little bird flies, in his usual way, at the rate of one mile in a minute, which, from the many experiments I have made, I believe to be within the truth; and that he is so engaged for ten hours every day; and further, that this active life is extended to ten years—many of our small birds being known to live much longer, even in a state of domestication—the amount of all these, allowing three hundred and sixty-five days to a year, would give us two million one hundred and ninety thousand miles—upward of eighty-seven times the circumference of the globe!"

These birds commonly build in barns, often attaching their nests to the rafters. They are cup-shaped, and consist of mud, laid in regular strata, mixed with hay, and lined with feathers. It usually requires a week for them to construct one of these, during which period they manifest the most industrious activity. The eggs are usually four in number, and there are two broods in a season. Two popular errors in regard to this bird have extensively prevailed: one was, that if a swallow was killed by any one about the barn, the cows would give bloody milk; another, that they buried themselves in deep, miry ground, and lay in a torpid state during the winter. These fallacies are now wholly discarded.



THE BANK-SWALLOW OR SAND-MARTIN.

The Bank-Swallow or Sand-Martin, *H. riparia*, is common to Europe, Asia, and America; its length is five inches; the upper parts are grayish-brown; under parts white. It appears to be the most sociable with its kind, and the least intimate with man, of all our swallows, living together in large communities of sometimes three or four hundred. On the high, sandy bank of a river, quarry, or gravel-pit, at a foot or two from the surface, they commonly scratch out holes for their nests, running them in a horizontal direction to the depth of two and sometimes three feet. Several of these holes are often within a few inches of each other, and extend in various strata along the front of the precipice, sometimes for eighty or one hundred yards. At the extremity of this hole a little fine dry grass, with a few large downy feathers, form the bed on which their eggs, generally five in number, and pure white, are deposited. The young are hatched late in May, and then the common crow, in parties of four or five, may sometimes be seen watching at the entrance of these holes, to seize the first straggling young one that should make its appearance. From the clouds of swallows that usually play round these breeding-places, they remind one at a distance of a swarm of bees.

Other American species are the Republican or Cliff-Swallow, *H. opifex*, noted for associa-

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ting in large numbers, and building groups of gourd-shaped nests on the faces of cliffs; found throughout the United States: WILSON'S WHITE-BELLIED SWALLOW, *H. bicolor*, a very handsome species, also known throughout our country; the THALASSINA SWALLOW, *H. Thalassina*, the most beautiful of the family, found in New Mexico, California, and Mexico; the ROUGH-WINGED SWALLOW, *H. serripennis*, found from Pennsylvania to Louisiana; and the *H. fulva*, common in Jamaica.

Genus PROGNE: *Progne.*—This includes many species, and among them the PURPLE MARTIN, *P. purpurea*, seven and a half to eight inches long; the entire plumage black, with a silky purple and bluish luster. This well-known bird is a general inhabitant of the United States, and a particular favorite wherever he takes up his abode. Wilson says: "I never met with more than one man who disliked the martins and would not permit them to settle about his house. This was a penurious, close-fisted German, who hated them because, as he said, 'they ate his *peas*.' I told him he must certainly be mistaken, as I never knew an instance of martins eating *peas;* but he replied with coolness, that he had many times seen them himself 'blaying near the hife, and going *schnip, schnap*,' by which I understood that it was his *bees* that had been the sufferers; and the charge could not be denied."

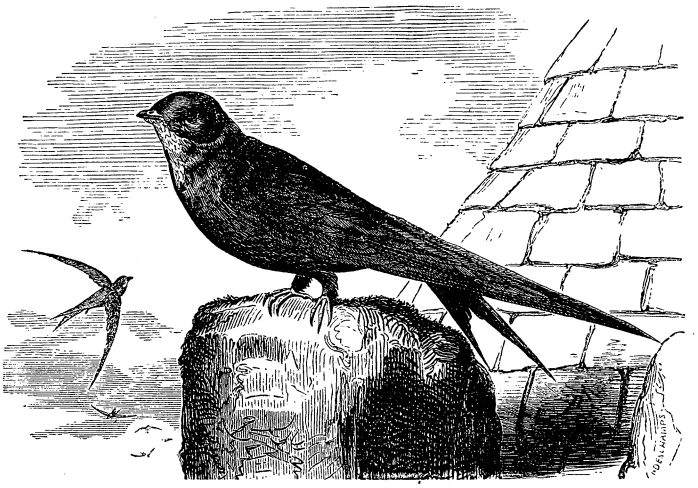
This sociable and half-domesticated bird arrives from the south late in April or early in May; its summer residence is universally among the habitations of man, who, having no interest in his destruction, and deriving considerable advantage, as well as amusement, from his company, is generally his friend and protector. Wherever he comes, he finds some hospitable retreat fitted up for his accommodation and that of his young, either in the projecting wooden cornice on the top of the roof or sign-post, in the box appropriated to the bluebird, or, if all these be wanting, in the dove-house among the pigeons. In this last case, he sometimes takes possession of one quarter or tier of the premises, in which not a pigeon dare for a moment set its foot. Some people have large conveniences formed for the martins, with many apartments, which are usually fully tenanted, and occupied regularly every spring; and, in such places, particular individuals have been noted to return to the same box for successive years.

The Purple Martin, like his half-cousin, the kingbird, is the terror of crows, hawks, and eagles. These he attacks whenever they make their appearance, and with such vigor and rapidity that they instantly have recourse to flight. So well known is this to the lesser birds and the domestic poultry, that, as soon as they hear the martin's voice engaged in fight, all is alarm and consternation. To observe with what spirit and audacity this bird dives and sweeps upon and around the hawk or the eagle is astonishing.

There are several species of this genus belonging to South America, one of which, the WESTERN MARTIN, *H. chalybea*, is sometimes seen within the southern boundaries of the United States.

Genus CYPSELUS: *Cypselus.*—This includes several species, called *Swifts*, of which the AMERICAN CHIMNEY-SWALLOW or AMERICAN SWIFT, *C. acutus*—the *Acanthylis Pelasgia* of Linnæus—is a well-known species. It is four to six inches long; the whole body deep brown, with a greenish luster on the head and neck; the wings very long, extending beyond the tail. The flight of this bird, like that of the other species of the genus, is bold, vigorous, and rapid, the wings being bent downward, and kept in constant motion. This laborious flight is kept up, with little interruption, from dawn to twilight, that is, for fourteen hours. The great peculiarity of the species is, that it builds its nest and rears its young, often hundreds together, in chimneys, not of deserted but inhabited houses, though they avoid those in which a fire is kept. The nest is of a singular construction, being formed of very small twigs, fastened together with a strong, adhesive glue or gum, which is secreted by two glands, one on each side of the hind part of the head, and mixes with the saliva. With this glue, which becomes hard as the twigs themselves, the whole nest is thickly besmeared. The nest is small and shallow, and attached by one side or edge to the wall, and is totally destitute of the soft lining with which the others are so plentifully supplied. The eggs are generally four, and white. There are two broods in the season. The young are fed at intervals during the greater part of the night. The noise which the old ones make, in passing up and down the funnel, has some resemblance to distant thunder. When heavy and long-continued rains occur, the nest, losing its hold, is precipitated to the bottom. In 1857, during a long season of wet, cold weather in June, four hundred and eighty of

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THE COMMON EUROPEAN SWIFT.

these birds, young and old, were precipitated down a single chimney in Woodbury, Connecticut. In this case all died, but often the young scramble up along the vent, to which they cling like squirrels, the muscularity of their feet, and the sharpness of their claws being remarkable.

The COMMON SWIFT of Europe, *C. apus*, resembles the preceding in form and manner of flight, but it builds in cavities under the eaves of houses, in holes about steeples, old towers, and walls.

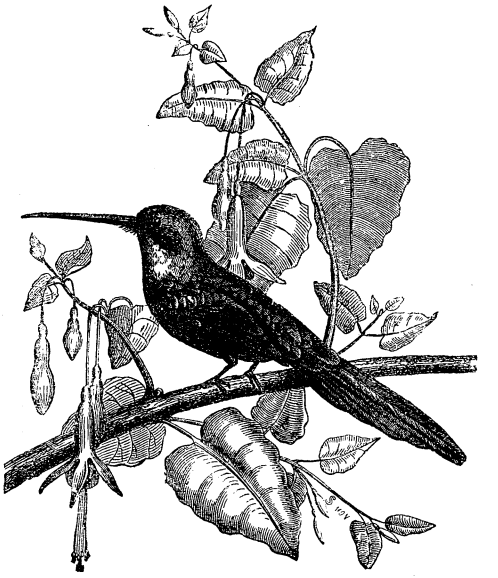
The ALPINE SWIFT, *C. Alpinus*, surpasses other species in speed, and feeds on insects very high in the air. It is found in summer in the high mountains of Southern Europe, and has been occasionally found in Great Britain. Its length is eight inches and a half.

Genus COLLOCALIA: *Collocalia.*—This includes the ESCULENT SWALLOW, *C. esculenta*, the fabricator of the celebrated birds' nests which enjoy such a high repute among the Chinese for their excellence as an article of food. These are composed of a mucilaginous substance, usually more or less mixed with fragments of grass, hair, and similar materials; they are attached to the surface of rocks in caverns, and the birds always build in great numbers together in the same cave. It was formerly supposed that the mucilaginous matter employed in the construction of the nests was obtained from sea-weeds eaten by the birds, but it is now ascertained beyond doubt that the substance in question is secreted by greatly developed salivary glands. These birds are found in great abundance in all parts of the Eastern Archipelago, and also on the continent of India; the nests are collected in great quantities, and constitute an important article of commerce with China. Almost all our knowledge of the mode in which the harvest of nests is managed is derived from the island of Java, which produces about two hundred and fifty-six hundred weight annually. The nests are collected in Java at three different periods, namely, in March, September, and December. The interval of six months, from March to September, gives the birds time to rear two broods, and the quantity of nests is consequently greater than at the other two periods of collecting, but the produce is generally of inferior quality; the lesser intervals between the collection in September and that in December, and again between the latter and that in March, scarcely allows the birds to get their progeny out of the nests, and many young ones are accordingly destroyed at these periods, but the nests are of superior quality, and very white. The prices paid for these nests in the Canton market vary greatly, according to the quality: those of the best and purest sort fetch the enormous price of three thousand five hundred Spanish dollars the pecul, or about twenty-five dollars a pound; the second quality brings two thousand eight hundred Spanish dollars per pecul, and the third not more than one thousand six hundred dollars. In some parts of China, however, as much as forty dollars has been paid for a catty of bird's nests, or rather more than one pound and a quarter. These expensive articles are principally employed in making soup, but they are also made use of in various ways, and are regarded as a great delicacy by the Chinese epicures.

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THE COMMON ROLLER.

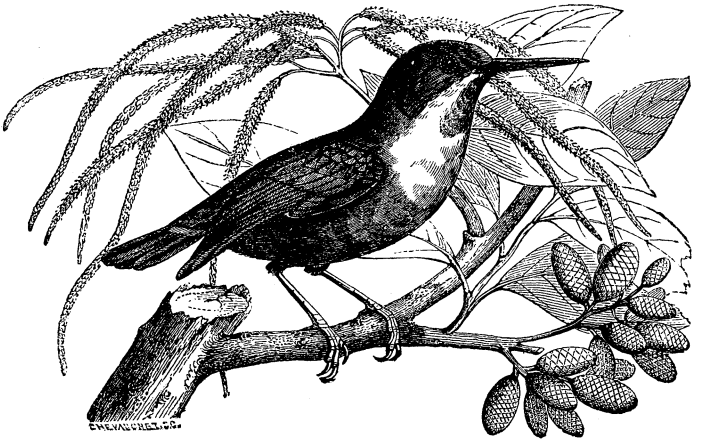


THE RED-TAILED JACAMAR.—(See p. 96.)

THE CORACINÆ OR ROLLERS.

This family comprises not only the Rollers proper, but three other sub-families, which we shall notice under four generic heads.

Genus ROLLER: *Coracias.*—This includes several species, which subsist on fruits and insects. One species, the COMMON ROLLER of Europe, *C. garrula*, is thirteen inches long, light brown above and bluish-green below; the tail-feathers are a greenish-blue. It is a handsome bird, noisy and restless, very shy, and living in the depths of the forests. In Germany it is called *Birk-häher* or *Birch-Jay.* It breeds in the holes of trees, and sometimes in holes which it excavates in the banks of rivers.



THE GREEN TODY.

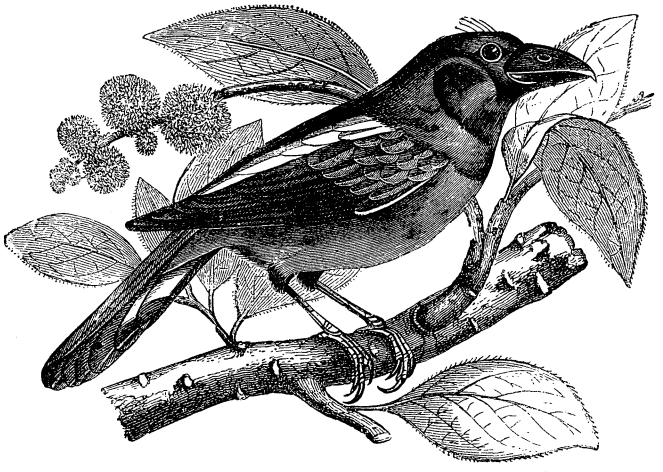
Genus TODUS: *Todus.*—Of this there are three or four species; the best known is the GREEN TODY, *T. viridis.* It is a very common bird in some of the West Indian Islands. It is about the size of a wren; all the upper parts are of a vivid grass-green color, the neck and throat red, the breast whitish, and the belly yellowish. It is a bold and familiar bird, paying little attention to the presence of man, and exhibiting great confidence when in captivity, seeking its insect prey

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in the room with the greatest freedom. Its holes for nestling are dug in banks to the depth sometimes of eight inches or a foot.

Genus MOTMOT: *Prionites* or *Momotus.*—Of this there are several species in tropical America; they are heavy in form and slow in movement, living retired in the depth of the forests, where they remain perched on trees near old buildings, the head drawn back between the shoulders, and every now and then emitting a sort of hoarse croak. In the morning and evening, however, they show a greater degree of activity in pursuit of the insects which constitute their principal sustenance; these they take by pouncing upon them after a short flight. They do not confine themselves to such small game, but seem able to prey upon lizards and small snakes, and even occasionally upon small birds. They are said to take these larger objects in the bill, throw them up into the air, and swallow them as they fall. Fruits also form a portion of their food. They are remarkable for a curious sort of mutilation which they are supposed to practice on themselves. The two middle feathers of the tail are considerably elongated, and in most specimens, the barbs are wanting on a portion of the stem a little before the tip, so that a portion of the shaft is left quite bare at this point. There seems to be no other way of accounting for this than by supposing that the birds, probably from some mistaken notion of elegance, deliberately pick off the barbs of this part of the feathers. The best known species is the Brazilian Motmot, *M. Brasiliensis*, which is about the size of a thrush, and of a deep, rich, green color, with the forehead bluish, the back of the head violet, and the crown black.

Other species are the Houtou Motmot, *P. momota*, and the Tutu Motmot, *P. tutu.*



THE JAVA EURYLAME.

Genus EURYLAIMUS: *Eurylaimus.*—Of this there are several species, noted for their large bill; they are nearly allied to the todies, their principal difference consisting in the structure of the feet, the outer toe only being united to the middle one. The nostrils also are placed near the base of the bill. They are generally of small size, but adorned with beautiful and brilliant colors, and live in the most retired parts of the countries occupied by them, principally in marshy places and along the margins of lakes and rivers. They inhabit Java, Sumatra, and New Guinea. They are usually seen in small flocks, and feed for the most part on insects and worms, although the stomachs of some of the species have been found to contain nothing but vegetable substances. Their nests, which are composed of small twigs, are suspended from the extremities of the branches of trees, usually those overhanging the water, and the number of eggs is said to be only two. The Java Eurylame, *E. Javanicus*, has the head and neck of a bright venous red; the back and wings black, flamed with golden yellow; the under parts venous red.

There are beside several genera of allied birds, inhabiting the same regions, as the *Cymbirrhynchus*, *Erolla*, and *Corydon.*

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THE TROGONS OR COUROUCOUS.



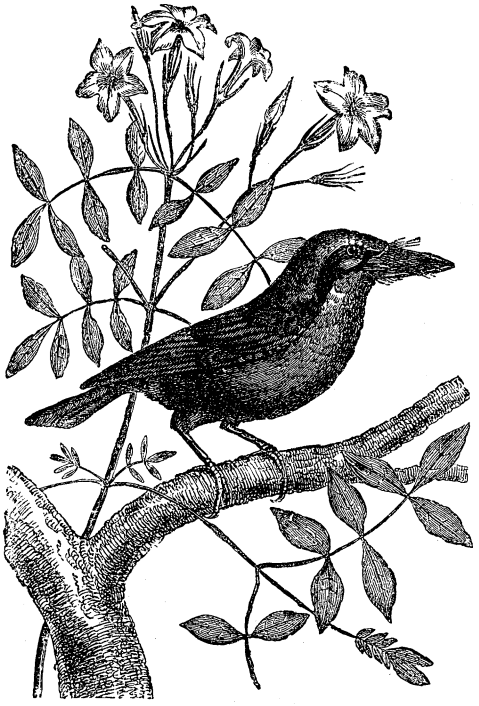
RESPLENDENT TROGON—MALE AND FEMALE.

These splendid birds are found in the tropical regions of both hemispheres, but most of the species inhabit South America. They frequent the thickest parts of the forests, where they feed principally upon insects, which they capture on the wing and sometimes pick from the bark of trees. Some of the species, however, derive their chief nourishment from fruits and berries. They lay their eggs in the holes of rotten trees, upon the débris usually found in such situations, and, like the woodpeckers, frequently enlarge the holes by means of their strong bills. Their cry is peculiar and melancholy, resembling the word *couroucou*, which has hence been applied to them as a vernacular name. Their bills have tufts of bristles at the base; their plumage is adorned with bright colors, and often most brilliantly metallic, and the beauty of their appearance is frequently greatly enhanced by the elegance of their long tails. They vary considerably in size, some of the smallest being little larger than a sparrow, while the largest are of the size of a pigeon. The ancient Mexicans made exquisite feather pictures of the plumes of these birds, and Montezuma was so delighted with them that he kept an extensive aviary of them.

The Resplendent Trogon, *T. resplendens*, has the plumage of a beautiful bronzed golden green color; the two middle feathers of the tail, which are much longer than the body and very broad, give it a peculiarly graceful appearance. It is a native of Guatemala, and is called by the inhabitants, *Quesal:* its gorgeous plumes are much sought after by the natives of that country as ornaments; formerly they were only allowed to be worn by persons of the highest rank. They are exceedingly difficult to procure, from their usually frequenting the highest trees of the forest, and when the collector has succeeded in shooting them, they generally lose a portion of their light plumage in their fall, while the extraordinary tenderness of their skins renders the operation of skinning them a most difficult matter.

Nearly forty species of Trogon are known, three-fourths of which belong to tropical America; one species to Africa, and the rest to Asia and the Asiatic islands. The habits of some of these are as remarkable as their plumage; we are told that the young of the *T. Narina*, of South America, immediately follow their parents on the wing, after being hatched. One species, *T. Mexicanus*, is found on the Rio Grande.

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THE BUCCO VERSICOLOR.



THE RED-THROATED TAMATIA.

THE BUCCOS, BARBETS, OR PUFF-BIRDS.

In this group the bill is very stout and conical, and inflated at the base, which is furnished with several tufts of strong bristles; the tip of the upper mandible is curved or hooked; the nostrils are concealed by the plumes and bristles of the forehead; the toes are arranged in pairs, in the same way as in the scansorial birds, with which they were formerly placed. The name of *Puff-Birds* is applied to them from the manner in which their plumage is puffed out, a character which gives them a dull, heavy appearance. This aspect is in accordance with their mode of life, as they are solitary and melancholy birds, inhabiting the recesses of the forests of tropical America, where they perch upon the branches of trees to look out for the insects which constitute their food. They are said to perch in the same spot for months together. They also occasionally creep upon the bark of trees in search of insects, supporting themselves with the tail-feathers when in this position, like the woodpeckers. They nestle in holes of trees. There are several genera and many species.

The *Genus* BUCCO: *Bucco*, includes the BUFF-FACED BARBET, *B. chrysopogon*, which is of gray plumage, lives in small flocks, and is found in Africa and Asia; also, the *B. versicolor*, found in Sumatra.

The *Genus* BARBICAN: *Laimodon;* this name indicates the resemblance in the species both to the Barbets and the Toucans: the BARBARY BARBICAN, *L. dubius—Pogonias major* of Cuvier —is black above and red beneath; the flanks yellow. It is an exceedingly brilliant bird.

Genus BARBACOU: *Monasa.*—The species of this are of solitary and sedentary habits, and resemble the cuckoos. The WHITE-FACED BARBACOU of Brazil, *M. personata*, is one of the best known species. It is of the size of a thrush.

The *Genus* TAMATIA: *Tamatia*, includes the PIED BARBET, *T. macrorhynchos.* Swainson says: "There is something very grotesque in the appearance of all the puff-birds, and their habits in a state of nature are no less singular. They frequent open, cultivated spots near habitations, always perching on the withered branches of a low tree, where they will sit nearly motionless for hours, unless indeed they descry some luckless insect passing near them, at which they immediately dart, returning again to the identical twig they had just left, and which they will sometimes

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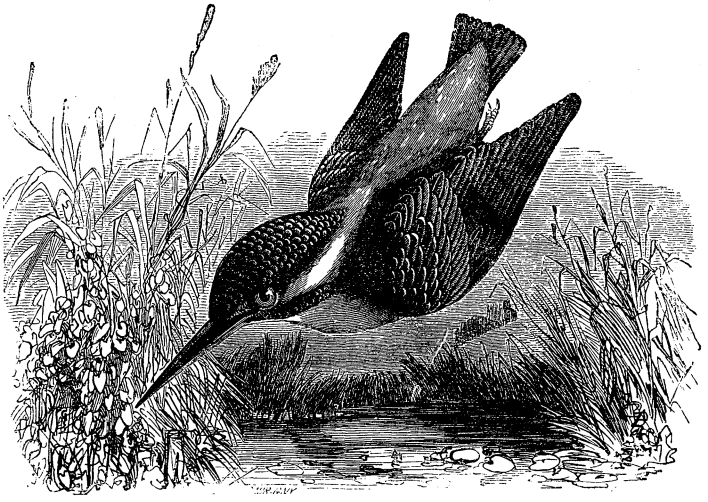
frequent for months. At such times the disproportionate size of the head is rendered more conspicuous by the bird raising its feathers so as to appear not unlike a puff-ball; hence the general name they have received from the English residents in Brazil, of which country all the species, I believe, are natives. When frightened, this form is suddenly changed by the feathers lying quite flat. They are very confiding, and will often take their station within a few yards of the window. The two sexes are generally near each other, and often on the same tree." The length of this species is about eight inches; plumage black and white, the belly being tinged with buff.

The RED-THROATED TAMATIA, *T. maculata*, is of a reddish-brown, and is found in Guiana.

THE GALBULIDES OR JACAMARS.

This group includes several genera and several species: they are very handsome birds, adorned with bright colors, green being predominant. They are peculiar to tropical South America and the West Indies, where they generally lead a solitary life in the forests, perched upon trees watching for insects, on which they prey.

The *Genus* JACAMAR: *Galbula*, includes the COMMON JACAMAR, *G. viridis;* it is of a brilliant golden-green, eight inches long, and is found in Cayenne. The RED-TAILED JACAMAR, *G. rufi-cauda*, inhabits the island of Trinidad. It is of a golden-green color above; the throat white; the breast red; the tail golden-green and red. (See p. 92.)



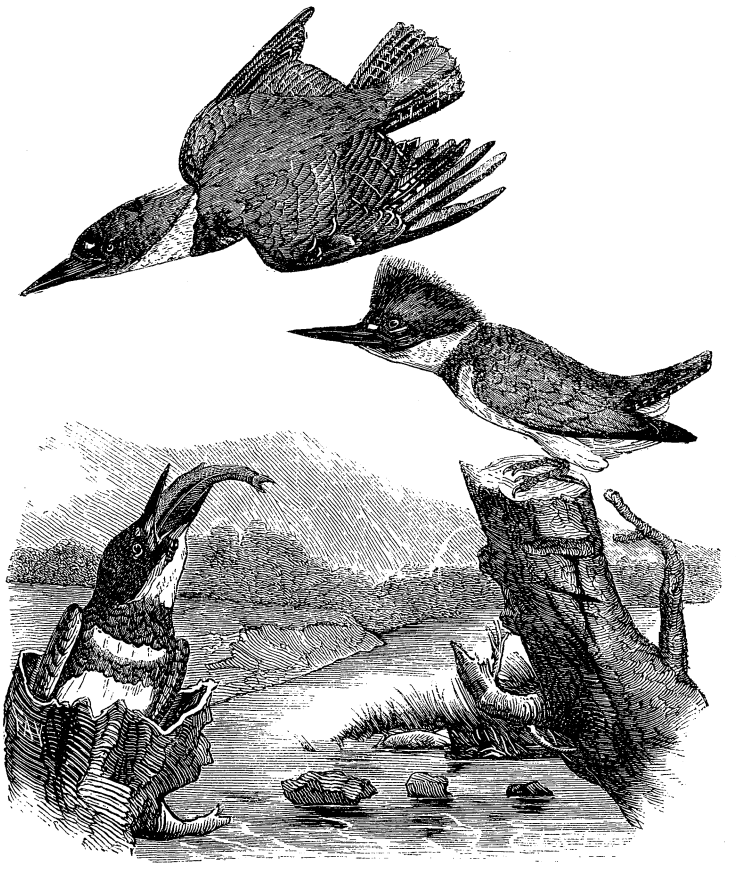
THE EUROPEAN KINGFISHER.

THE KINGFISHERS OR HALCYONIDÆ.

In this family, which, according to some authors, includes the barbets and jacamars, the bill is long, straight, angular, and pointed; there are various species, feeding principally on fish, which they catch by darting suddenly down upon them from some perch on which they sit watching for their prey; they also eat small crustacea, reptiles, and insects. They make their nests in holes and in cavities along the banks of rivers and lakes.

Genus ALCEDO: *Alcedo.*—This term is the Latin for kingfisher, and the genus includes the COMMON KINGFISHER of Europe, *A. ispida*—the *Martin Pêcheur* of the French; *Martino Pescatore* of the Italians; and *Gemeine Eisvogel* of the Germans: probably the *Halcyon* of the Greeks. Its length is about seven inches; the upper part of the head, the wing-coverts, and a stripe on each side of the neck, are green, covered with light-blue spots; the upper part of the back is dark green, the lower part and rump bright blue; the throat, and a streak on each side of the neck, are yellowish-white, and the lower parts pale chestnut. The quill-feathers of the wings are greenish-black, and those of the tail deep blue. All these colors have the metallic brilliancy of the tropical birds. It is found throughout Middle Europe, living in the milder parts, and even in England, all the year. Its flight is rapid and darting, like an arrow. It is a solitary bird, in-

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BELTED KINGFISHERS.

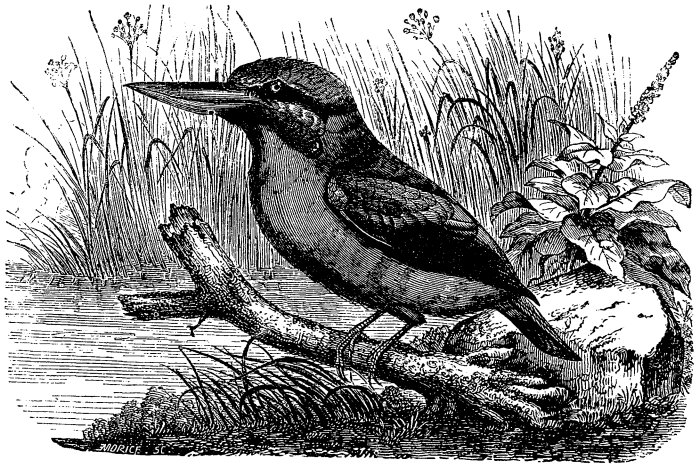
habiting the banks of small streams, and perching upon the branches of trees overhanging the water, to watch for its finny prey, stickle-backs and minnows forming the greater part of its ordinary meal. For the purpose of breeding it takes possession of a hole in the bank formed by some burrowing animal, and adapts it to its use; here it appears to resort to disgorge the bones of the fishes which it has swallowed, for the floor of the holes frequented by it is always found covered with these remains, and it is upon them that the female lays her eggs. These are usually from five to seven in number, and of a delicate pinkish-white color. Among the ancients the most extraordinary ideas were entertained with regard to the nests of the kingfisher, and these crept into the writings of the older English poets. It was believed that the bird made a floating nest on the sea, and that during the period that she was engaged in hatching her eggs, the water always remained so smooth and calm that the mariner might venture on his voyage without danger of being exposed to any of the perils of the deep; in fact, some of the ancient writers attributed to this little bird the power of allaying the violence of the waves. The period of incubation was accordingly known as the "*Halcyon days*," and the same term is still often employed metaphorically to express any period of uninterrupted happiness. Some of the modern superstitions connected with the kingfisher are scarcely less curious: it has been supposed that if the body of the bird is suspended by the bill its breast will always indicate the north; that when suspended and accurately balanced, its bill will always point in the direction of the wind, although the bird may be kept in-doors; and that the possession of its head and feathers furnishes a protection against witchcraft, a security for fair weather at sea, and a certain means of securing the affections of a coy or disdainful sweetheart. These superstitions still hold their ground in some parts of Great Britain.

Genus CERYLE: *Ceryle*.—This includes various species in different parts of the world, and

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among them the Belted Kingfisher, *C. alcyon:* this is a general inhabitant of the United States, and, with a single exception, is the only species known to this country. It is twelve inches long, of robust form, the upper parts and a belt across the breast light ashy-blue, beneath white. On the head the feathers are often lifted into a crest. Wilson, in his happy vein, says: "Like the lovelorn swains of whom the poets tell us, he delights in running streams and falling waters; not, however, merely that they may soothe his ear, but for a gratification somewhat more substantial. Amid the roar of the cataract, or over the foam of a torrent, he sits perched upon an overhanging bough, glancing his piercing eye in every direction below for his scaly prey, which, with a sudden, circular plunge, he sweeps from their native element, and swallows in an instant. His voice, which is not unlike the twirling of a watchman's rattle, is naturally loud, harsh, and sudden, but is softened by the sound of the brawling streams and cascades among which he generally rambles. He courses along the windings of the brook or river, at a small height above the surface, sometimes suspending himself by the rapid action of his wings, like certain species of hawks, ready to pounce on the fry below; now and then settling on an old, dead overhanging limb to reconnoiter. Mill-dams are particularly visited by this feathered fisher, and the sound of his pipe is as well known to the miller as the rattling of his own hopper. Rapid streams, with high perpendicular banks, particularly if they be of a hard clayey or sandy nature, are also favorite places of resort for this bird; not only because in such places the small fish are more exposed to view, but because those steep and dry banks are the chosen situations for his nest. Into these he digs with bill and claws horizontally, sometimes to the extent of four or five feet, at the distance of a foot or two from the surface. The few materials he takes in are not always placed at the extremity of the hole, that he and his mate may have room to turn with convenience. The eggs are five, pure white, and the first brood usually comes out about the beginning of June, and sometimes sooner, according to the part of the country where they reside. They are very tenacious of their haunts, breeding for several successive years in the same hole, and do not readily forsake it, even though it be visited."

The Texan Green Kingfisher, *C. Americana*, is only about seven inches long, and is well known in South America; it has been seen in Texas on the Rio Grande. Several other species of the genus are known in Mexico and South America.



THE BLACK-BANDED DACELO.

Genus DACELO: *Dacelo.*—This includes several species, found in various parts of the world, and called *Martin Chasseur* by the French; they are noted for a large, heavy bill, and for feeding on earth-worms, larvæ, and insects, instead of fish. Their haunts are marshy and humid spots in forests. The Black-banded Dacelo, *D. atricapilla*, is a large species, found at the Cape of Good Hope.

The Great Brown Kingfisher or Gigantic Dacelo, *D. gigantea*, is eighteen inches long;

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its color olive-brown above and white beneath; it is called the *Laughing Jackass* by the colonists of the Cape, on account of its loud, uncouth song.

The whole number of known species of kingfishers is about ninety; the preceding descriptions of some of the most remarkable will give a general idea of the whole. While some of these birds are as large as a crow, there are others of the genera *Ispidina* and *Ceyx* which are not larger than a chipping-bird, yet dive and catch fish, proportioned to their size, like their larger relations.

THE MEROPIDÆ OR BEE-EATERS.



THE NAMAQUA BEE-EATER.

These birds are confined to the eastern hemisphere, in the tropical parts of which they are most abundant. They have a long, curved bill, and are generally adorned with brilliant colors, among which green is most common. They live on insects, which they capture in the air, and are especially fond of wasps and bees, whence their English name of *Bee-Eaters*, and their French name of *Guépier*.

Genus MEROPS: *Merops*.—This includes the COMMON BEE-EATER of Europe, which is ten inches long, of a very slender form, and long, slender bill: it is brownish-red above, the lower parts different shades of green. It migrates in large numbers from Africa to the south of Europe, usually in flocks of twenty to thirty. They are of gregarious habits, often being seen soaring about in company like swallows. Their nests consist of holes about six inches deep, which they excavate in the clayey banks of rivers and lakes; the eggs are from five to seven. They frequently utter a warbling note. In their manner of flying and seizing their prey they resemble the fly-catchers.

This is the only species known to Europe; others are found in Africa and Asia: the NAMAQUA BEE-EATER, *Rhinopomastes Cyanomelas*, is of an azure-blue above and black beneath; found in Western Africa. There are still other genera and other species.

TENUIROSTRES.

In the birds of this group the bill is always slender, although very variable in its length and form, being sometimes perfectly straight and sometimes much curved. The tip of the upper mandible is usually entire and acute. The toes are elongated, especially the hinder one, and the outer toe is usually more or less united to the middle one at the base. Their food consists principally of insects, which they generally capture on plants and trees, rarely on the wing or on the ground. The majority are destitute of the peculiar arrangement of the lower larynx, by which the beautiful songs of the Dentirostral birds are produced. This group includes several remarkable and interesting families, as follows: the *Rifle-Birds*, the *Plumed Birds* or *Epimachinæ*, the *Hoopoes*, *Guitguits*, *Sun-Birds*, *Humming-Birds*, *Honey-Eaters*, *Oven-Birds*, *Creepers*, *Nuthatches*, and *Wrens*.

THE RIFLE-BIRDS.

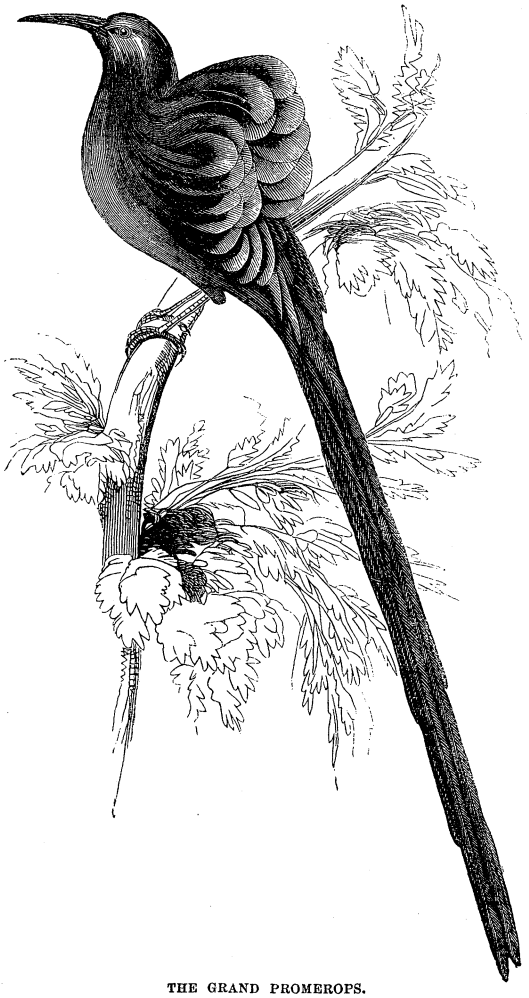
These are exceedingly beautiful and brilliant birds, found only in Australia.

Genus PTILORIS: *Ptiloris*.—Of this two species are known; the common species, the PARADISE RIFLE-BIRD, *P. paradiseus*, is the most gorgeous in its plumage of the Australian birds. It is of a rich velvet-black, with the head and neck of a most brilliant bluish-green. The feathers of the lower surface are bordered with rich olive-green, and the two central tail-feathers are me-

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tallic-green. The female is dull and somber in its colors. This bird is found in the southeastern portion of Australia, where it climbs upon the trunks of trees in the same manner as the Creepers, which it resembles in its general habits. Little is known of the mode of life of the other species.

THE PLUMED BIRDS OR EPIMACHINÆ.



THE GRAND PROMEROPS.

These have usually been associated with the birds of Paradise, which they rival in the splendor of their plumage. Some of them are furnished with long, dazzling plumes, similar to those which distinguish these brilliant birds. The species are very few, and almost confined to New Guinea and the adjacent islands; one species is found in New Zealand, and two in Australia.

Genus EPIMACHUS: *Epimachus* of Cuvier, corresponding to the *Promerops* of Brisson, and the *Rhinopomastes* of Smith. This includes the *E. albus*, which is of a fine metallic violet-black color, with a broad collar of feathers margined with emerald-green at the base of the neck. Long floating plumes spring from the back and rump; they are of a white color, and very long, with long, silky, distant barbs, and twelve of the lower plumes are terminated by long filiform continuations of the shafts, which are curved and blackish toward the extremity; these formerly obtained for this species the name of the *Twelve-threaded Bird of Paradise.*

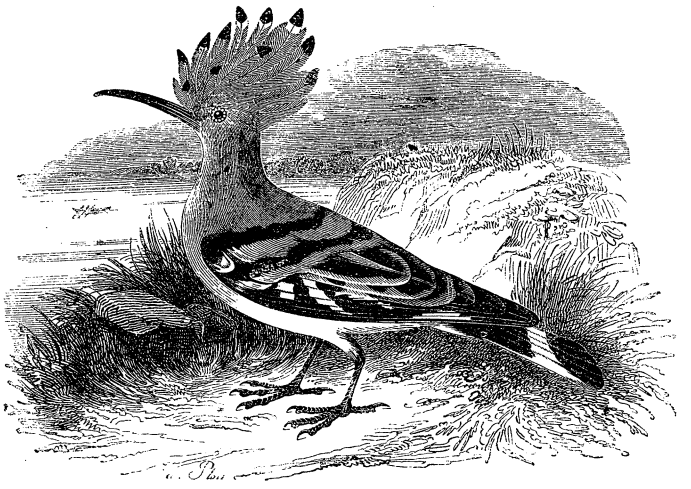
The GRAND PROMEROPS, *E. magnus*, is found in New Guinea, along the coasts; the general color is blackish-brown; tail three feet long, thrice as long as the body; feathers of the sides elongated, raised, curled, glittering on their edges with steel-blue, azure, and emerald-green, like precious stones; the head and the belly lustrous also with steel-blue. In truth, language fails to convey any just idea of the magnificence of this species.

THE HOOPOES OR UPUPIDÆ.

These, of which there are only a few species, all belong to the eastern hemisphere; they have the bill slender, slightly curved throughout, the tip acute; the toes long and strong, the outer one united to the middle toe at the base; the claws are curved and powerful. The crown of the head is ornamented by a crest of feathers, which the bird raises and lowers at pleasure.

The *Genus* UPUPA: *Upupa*, includes the COMMON HOOPOE, *U. epops:* it is widely dispersed over Africa, Asia, and Europe, being migratory in the latter country. It is twelve inches long, and of an exceedingly elegant appearance; the head and neck are of a pale red color; the fore part of the back light purplish-red; behind this it is of a reddish-white color, barred with black; the wings are black, with several irregular white bars, and the tail is black, with a single white bar

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THE HOOPOE.

The crest is very elegant, being composed of long feathers, each of which is tipped with black. It is found from Sweden to Spain, and is common in England and France. It builds in the holes of trees, forming the nest of a few stalks of grass and feathers; the eggs are usually from five to six in number, and of a pale lavender-gray color. These birds inhabit the neighborhood of woods, generally in marshy places, and seek their food—which consists of insects and worms—principally upon the ground, where they walk and run with great ease. They also frequently visit trees in search of their prey. They are fond of picking about in the filth around houses and stables, and are sometimes descriptively called *Dung-Birds* in England. In captivity they are easily tamed, and being highly intelligent, are very amusing. They have also very comical gestures, such as an almost constant nodding of the head, as if walking with a cane; at the same time they raise and lower their crest, and move their tail sideways and up and down. They will follow their keepers, and utter cries of joy at their approach. Their note resembles the word *hoop* pronounced softly and rapidly. The French call this bird *Huppe*, in allusion to its crest. Other species are the *U. Capensis*, or *Fregilupus Capensis*, and the *Falculia palliata*.

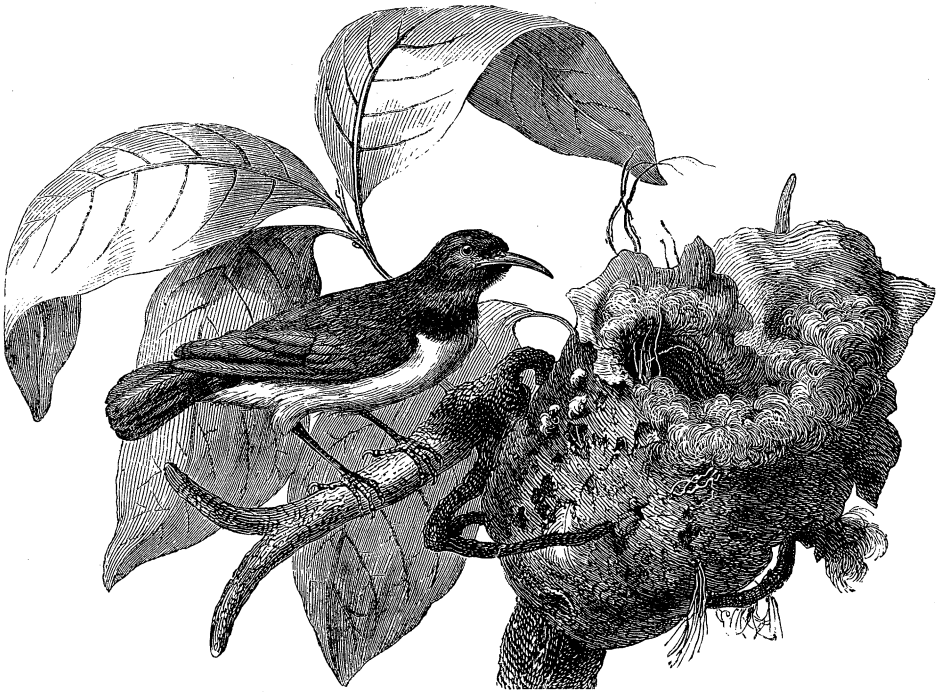
THE GUITGUITS OR CÆREBINÆ.

These have a straight or slightly curved bill, and are found in tropical South America and the West Indian Islands. They are small, slender birds, and feed principally on the small insects which they find in flowers; they are also said to feed on honey. Their plumage is exceedingly beautiful in color, but lacks the metallic brilliancy of that of the humming-birds and sun-birds. Their nests are of various forms, and built in different situations. Some species suspend them from the extremities of twigs, and these pendulous dwellings are sometimes furnished with a long funnel, through which the bird enters them; other species make the nest in a bush or tree, and in this case it is usually divided into two compartments, of which the outer serves as a vestibule, while the eggs are laid in the inner one, and are thus protected from the attacks of their enemies. The Azure Guitguit, *Cœreba cyanea*, is of a velvet black and blue color; the head golden. It is found in Guiana and Brazil.

THE SUN-BIRDS OR PROMEROPIDÆ.

These, which are called *Cinnyridæ* by some naturalists, and are closely allied to the *Upupidæ*, embrace two sub-families, one found in the eastern, the other in the western hemisphere. The former constitute the true Sun-Birds, which in India and the eastern archipelago seem to supply the place of the humming-birds of America; they even rival those living gems in the brilliancy of their colors, and their habits are very similar. In the morning and evening they are constantly seen in great numbers in the neighborhood of flowers, into which they thrust their slender bills

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THF SOUI-MANGA AND ITS NEST.

in search of the minute insects always found in such situations; they will also pick small spiders from their webs, and insects from the crevices of the walls and trees. They are said also to subsist partly on the juices of flowers, whence the name of *Sucriers* or *Sugar-Birds*, applied to them by French authors. Some of them also feed upon fruits. Like the humming-birds, they are exceedingly quarrelsome, fighting violently for the possession of a flower, the vanquished bird retreating from the spot with shrill cries, while the conqueror takes up his position upon a flower or stem, and swinging his little body to and fro, pours out a note of triumph. The song is said to be very agreeable.

An interesting species is the SOUI-MANGA, *S. cynniris*, its metallic colors shining with the most intense brilliancy. It makes its nest with great art on trees and shrubs. The nests of two other species, *Nectarinia Lotenia* and *N. Asiatica*, as described by Mr. Layard, are elegant domed structures, generally suspended from the extremity of a twig of some low bush, and artfully covered with cobweb. In this, Mr. Layard says, he has often seen the spider still weaving her toils, thus rendering the deception still more effective; and it would seem that the birds were aware of it, and left their helper undisturbed. The entrance to the nest is usually turned toward the interior of the bush, and is sheltered from the sun and rain by a sort of portico, which often projects more than an inch from the walls. In this snug tenement the little sun-birds lay from two to four eggs, which are of a whitish color, closely covered with minute, dusky spots, so that their general color appears gray.

THE TROCHILIDÆ OR HUMMING-BIRDS.

These birds, peculiar to the American continent, have excited the liveliest interest in every observer. There are more than three hundred distinct species, varying considerably in size: the *Ruby-throated Humming-Bird*, which is most commonly known in the United States, is three inches and a half long, and is about the medium size; the *Giant Humming-Bird* of Brazil is of the dimensions of the purple martin or chimney-swallow; several species are not larger than beetles. They vary also in form, some being robust and some slender; some having bills of enormous

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VARIOUS SPECIES OF HUMMING-BIRDS.

length, which, however, they use with admirable dexterity; others have tails three times the length of their bodies, and the tails of others suddenly expand at the end like a paddle or a spoon. They all live on small insects, which they catch in flowers, and on the honey of flowers, which also constitutes their only drink. The tongue is the chief weapon for capturing their prey and sucking up their nectar, and consists of a long double tube, formed like a double-barreled gun; at the tip it is flattened, and sometimes barbed. It is darted out with great dexterity, and is thus a very efficient instrument.

The metallic brilliancy of these birds has caused them often to be called "flying gems." Their plumage indeed defies description. The changeableness of the colors with the movements of these birds, is truly wonderful. Several of the species have an emerald-colored cravat; this is noticed to give out all the hues of green, and then the brightest and most golden tints, down to intense velvet-black. So the cravat of our Ruby-Throat gives out pencils of light, passing from reddish-orange to a crimson-black. These dazzling changes are infinitely diversified. A large space on the throat, the top of the head, and the under parts of the body, are usually the most brilliantly colored; the upper parts are plain. All these birds are not equally brilliant; some, indeed, are covered over with the most gorgeous colors; others are more modestly attired; in general the females have more somber plumage than the males. The ancient Mexicans appear to have appreciated the beauty of the humming-birds as well as that of the trogons. The radiant mantles worn by the natives in the time of Montezuma glittered with the spoils of these diminutive birds; these were also ingeniously employed by the native artists in executing the embroidered pictures which so much excited the admiration of Cortez.

The nests of these tiny birds are usually made of cotton, thistle-down, delicate fibers, fungus-like substances, and other soft materials; these are woven into a compact yet flexible cup-shaped cradle, which is placed on some branch of a tree, seldom more than fifteen feet from the ground. The exterior is covered with lichens, the right side always out, and in such a manner as to make the whole structure appear like a natural excrescence. The eggs are white, and almost invariably two in number.

The region which may be considered as the central home of the humming-birds is that portion

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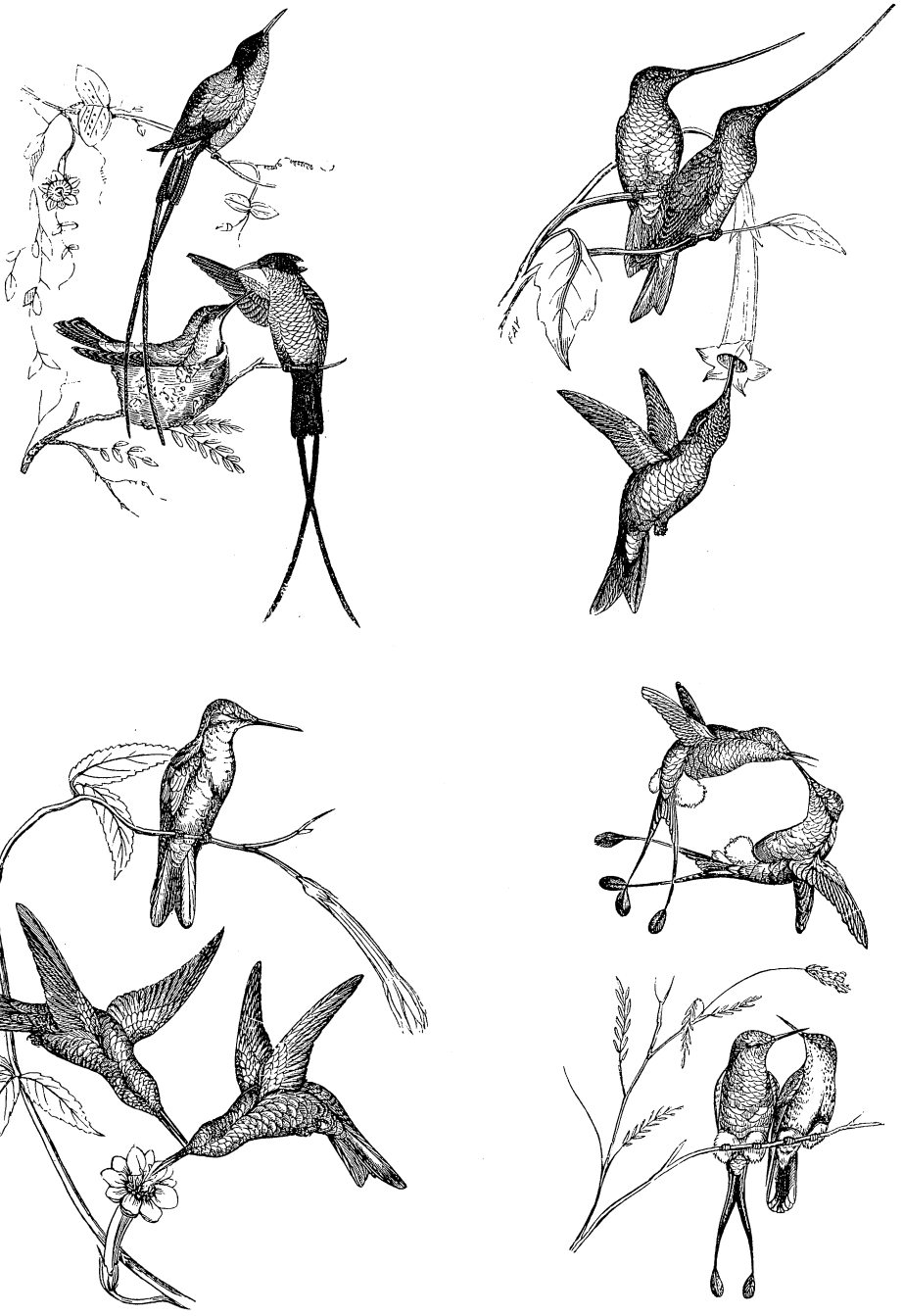
of the continent of America which lies between the northern boundary of Mexico and the southern limit of Brazil and Peru. They are particularly abundant in Mexico, Central America, and the West Indies. Their appearance in these tropical countries is thus described by Edwards in his "Voyage up the Amazon:"

"Wherever a creeping vine opens its fragrant clusters, or wherever a tree or flower blooms, may these little birds be seen. In the garden or in the woods, over the water, everywhere, they are darting about, of all sizes, from one that might easily be mistaken for a different variety of bird, to the tiny Hermit, whose body is not half the size of the bees buzzing about the same sweets. Sometimes they are seen chasing each other in sport with a rapidity of flight and intricacy of path the eye is puzzled to follow. Again, circling round and round, they rise high in mid-air, then dart off like light to some distant attraction. Perched upon a little limb, they smooth their plumes, and seem to delight in their dazzling hues; then darting off leisurely, they skim along, stopping capriciously to kiss the coquetting flowerets. Often two meet in mid-air and fight furiously, their crests and the feathers on their throats erected and blazing, and altogether pictures of the most violent rage. Several times we saw them battling with large, black bees, who frequent the same flowers, and may be supposed to interfere, often provokingly. Like lightning our little heroes would come down, but the coat of shining mail would ward off their furious strokes. Again and again would they renew the attack, until their anger had expended itself by its own fury, or until the apathetic bee, once roused, had put forth powers that drove the invader from the field."

Genus TROCHILUS: *Trochilus*, includes the Ruby-throated Humming-Bird, *T. colubris*, common in summer from Hudson's Bay to Mexico, and breeding throughout this wide space. Wilson's description of it is substantially as follows: "It is three inches and a half in length and four and a quarter in extent; the whole back, upper part of the neck, sides under the wings, tail-coverts, and two middle feathers of the tail, are of a rich golden-green; the tail is forked, and, as well as the wings, of a deep brownish-purple; the bill and eyes are black; the legs and feet, both of which are extremely small, are also black; the bill is straight and very slender. The sides of the belly and belly itself are dusky white, mixed with green; but what constitutes the chief ornament of this little bird is the splendor of the feathers of his throat, which, when placed in a proper position, glow with all the brilliancy of the ruby. These feathers are of singular strength and texture, lying close together like scales, and vary, when moved before the eye, from a deep black to a fiery crimson and burning orange. The female is destitute of this ornament, but differs little in other appearance from the male. In May it begins to build its nest. This is generally fixed on the upper side of a horizontal branch, not among the twigs, but on the body of the branch itself. In the woods it very often chooses a white-oak sapling to build on, and in the orchard or garden selects a pear-tree for that purpose. The branch is seldom more than ten feet from the ground. The nest is about an inch in diameter, and as much in depth. A very complete one is now lying before me, and the materials of which it is composed are as follows:—The outward coat is formed of small pieces of a species of bluish-gray lichen that vegetates on old trees and fences, thickly glued on with the saliva of the bird, giving firmness and consistency to the whole, as well as keeping out moisture. Within this are thick, matted layers of the fine wings of certain flying seeds, closely laid together; and lastly, the downy substance from the great mullein, and from the stalks of the common fern, lines the whole. The base of the nest is continued round the stem of the branch, to which it closely adheres; and, when viewed from below, appears a mere mossy knot or accidental protuberance. The eggs are two, pure white, and of equal thickness at both ends.

"The humming-bird is extremely fond of tubular flowers, and I have often stopped, with pleasure, to observe his maneuvers among the blossoms of the trumpet-flower. When arrived before a thicket of these that are full blown, he poises or suspends himself on wing, for the space of two or three seconds, so steadily, that his wings become invisible, or only like a mist; and you can plainly distinguish the pupil of his eye looking round with great quickness and circumspection; the glossy golden-green of his back, and the fire of his throat, dazzling in the sun, form altogether a most interesting appearance. When he alights, which is frequently, he always prefers the small,

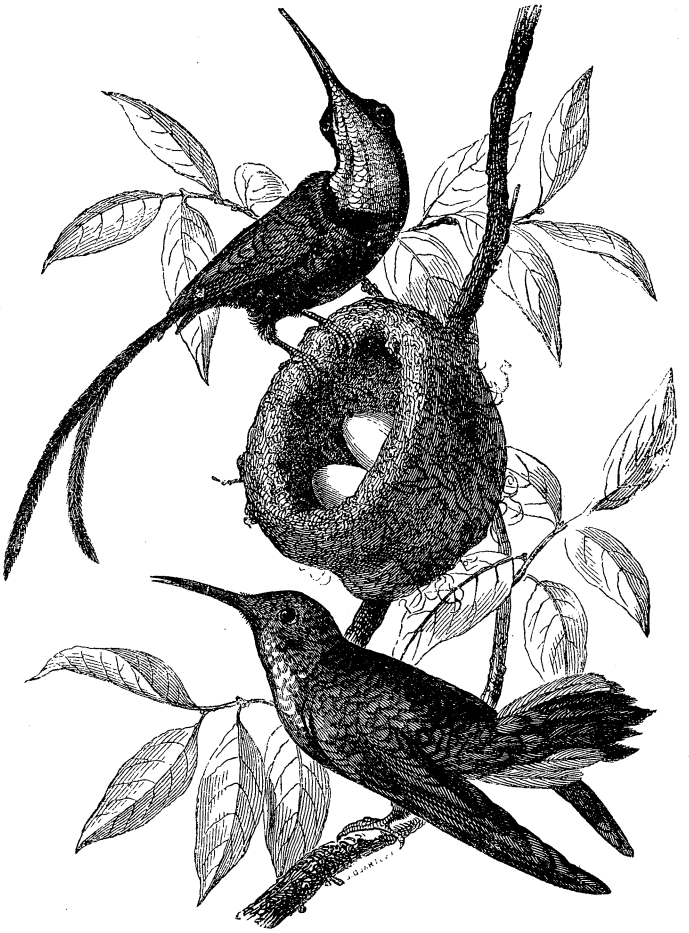
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HUMMING-BIRDS.

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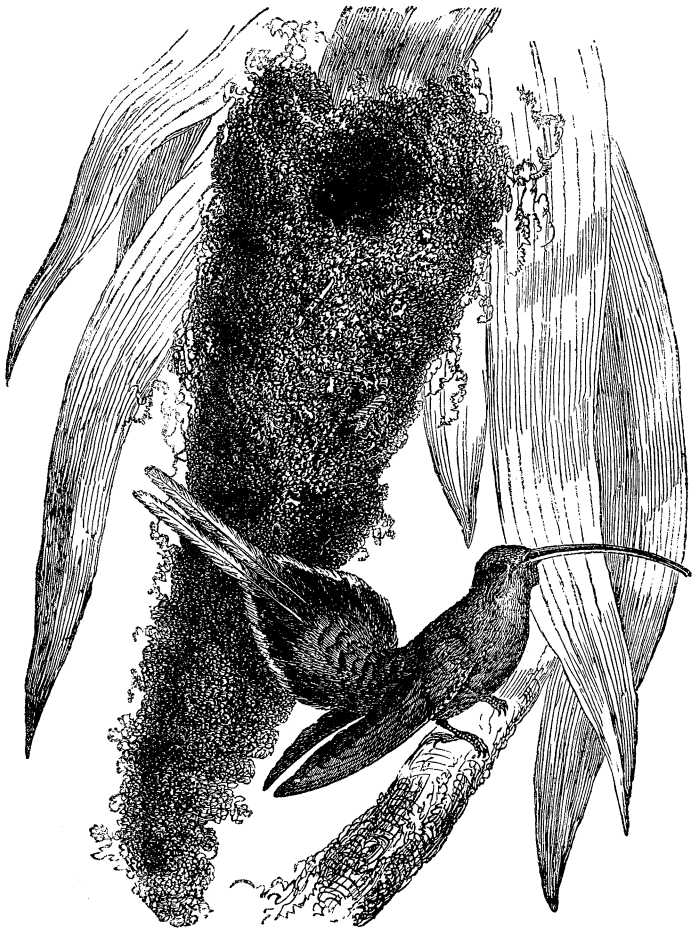
THE TOPAZ HUMMING-BIRD.

dead twigs of a tree or bush, where he dresses and arranges his plumage with great dexterity. His only note is a single chirp, not louder than that of a small cricket or grasshopper, generally uttered while passing from flower to flower, or when engaged in fight with his fellows; for, when two males meet at the same bush or flower, a battle instantly takes place, and the combatants ascend in the air, chirping, darting, and circling around each other, till the eye is no longer able to follow them. The conqueror, however, generally returns to the place to reap the fruits of his victory. I have seen him attack, and for a few moments tease the king-bird, and have also seen him, in his turn, assaulted by a humble-bee, which he soon put to flight.

"The humming-bird is one of those few birds that are universally beloved; and amid the sweet, dewy serenity of a summer's morning, his appearance among the arbors of honeysuckles and beds of flowers is truly interesting—

> "When the morning dawns, and the blest sun again
> Lifts his red glories from the eastern main,
> Then through our woodbines, wet with glittering dews,
> The flower-fed humming-bird his round pursues;
> Sips, with inserted tube, the honey'd blooms,
> And chirps his gratitude as round he roams;
> While richest roses, though in crimson drest,
> Shrink from the splendor of his gorgeous breast.
> What heavenly tints in mingling radiance fly!
> Each rapid movement gives a different dye;
> Like scales of burnish'd gold they dazzling show,
> Now sink to shade—now like a furnace glow."

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THE SUPERCILIOUS HUMMING-BIRD AND NEST.

The other species known in the United States are the MANGO HUMMING-BIRD, *T. mango*, larger than the Ruby-Throat, and common in the West Indies; occasionally seen in Florida: the ANNA HUMMING-BIRD, *T. Anna*, a Mexican species, sometimes seen in California; the NORTHERN HUMMING-BIRD, *T. rufus*, which extends its range along the Pacific to a high northern latitude; and the PURPLE-THROATED HUMMING-BIRD, *T. Alexandri*, found in Mexico and California, and figured by Cassin in his "Birds of America."

It would be in vain to attempt a lengthened description of even the more celebrated species of this multitudinous family; we can only mention a few of them. The TOPAZ HUMMING-BIRD, *T. pella*—the type of the beautiful genus *Topaza* of Gray—has the plumage red and ruby, with a topaz cravat; it inhabits Guiana.

The SUPERCILIOUS HUMMING-BIRD, *T. superciliosus*, is green above and gray beneath; the tail is brown, varied with white. It is remarkable for its large nest, ingeniously woven of the fibers of plants. It is found in Brazil.

The *Mellisuga minima*, found in South America and the West Indies, is only an inch and a quarter in length!

The DOUBLE-CRESTED HUMMING-BIRD, *T. cornutus*, is described as having two flattened fan-shaped crests, glistening with hues of polished gold and red copper, changing into the gemmy tints of the emerald and the ruby, now fire-colored, anon the purest green, and presently the brightest yellow.

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The male of the LONG-TAILED EMERALD HUMMING-BIRD, *T. polytmus*, is furnished with a most elegant forked tail, the two outer feathers being greatly prolonged and very slender. The whole length of the bird is a little more than ten inches, but about seven inches and a half of this is made up by the elongated feathers just mentioned. The head and the back of the neck of this little gem are deep velvet-like black; the whole of the back, with the wing and tail-coverts, golden-green; the wings and tail are purplish or bluish-black. The entire lower surface of the body are of a most gorgeous emerald-green color, except the neighborhood of the vent and lower tail-coverts, which are black. The bill is bright red, tipped with black, and the feathers of the back of the head are elongated, forming a sort of crest, which can be erected to a certain extent. Mr. Gosse gives the following account of its appearance in a state of nature, in his interesting work entitled "A Naturalist's Sojourn in Jamaica": "While I was up in a calabash-tree, the beautiful long-tailed humming-bird came shooting by, with its two long velvet-black feathers, fluttering like streamers behind it, and began to suck at the blossoms of the tree in which I was. Quite regardless of my presence, consciously secure in its power of wing, the lovely little gem hovered around the trunk, and threaded the branches, now probing here, now there, its cloudy wings on each side vibrating with a noise like that of a spinning-wheel, and its emerald breast for a moment flashing brilliantly in the sun's ray; then apparently black, all the light being absorbed; then, as it slightly turned, becoming a dark olive; then in an instant blazing forth again with emerald effulgence. Several times it came close to me, as I sat motionless with delight, and holding my breath for fear of alarming it and driving it away; it seemed almost worth a voyage across the sea to behold so radiant a creature in all the wildness of its native freedom."

THE HONEY-EATERS AND HONEY-CREEPERS.

These birds are mostly small in size, and are chiefly confined to Australia, New Guinea, New Zealand, and the adjacent islands. The bill is rather long, curved, acute, and slightly notched at the tip; the tail is long and broad. They feed on the pollen and nectar of flowers, and the insects which they find in and around them. Their tongue is long and protrusile, with a tuft of fibers at the end which aids them in obtaining their food. A few of the larger species feed on fruits. Their nests are made on bushes, sometimes suspended from the ends of twigs; the eggs are usually two in number. This family is called *Meliphagidæ* by naturalists.

There are numerous genera and species. The POE-BIRD or TUI, *Prosthemadera Novæ Zelandiæ*, is about the size of a thrush, of a fine glossy-black color, with two small tufts of white feathers hanging down upon the sides of the neck. These tufts have been compared to a pair of clerical bands, and, taken in conjunction with the black plumage of the rest of the body, have obtained for it the name of the *Parson-Bird*. It is a fine songster, and imitates every sound that reaches its ear, even learning to speak with great ease and fluency. It is exceedingly lively and restless, and feeds principally upon flies and small insects, which it is very expert in catching. It also eats worms and fruits. Its flesh is said to be delicious.

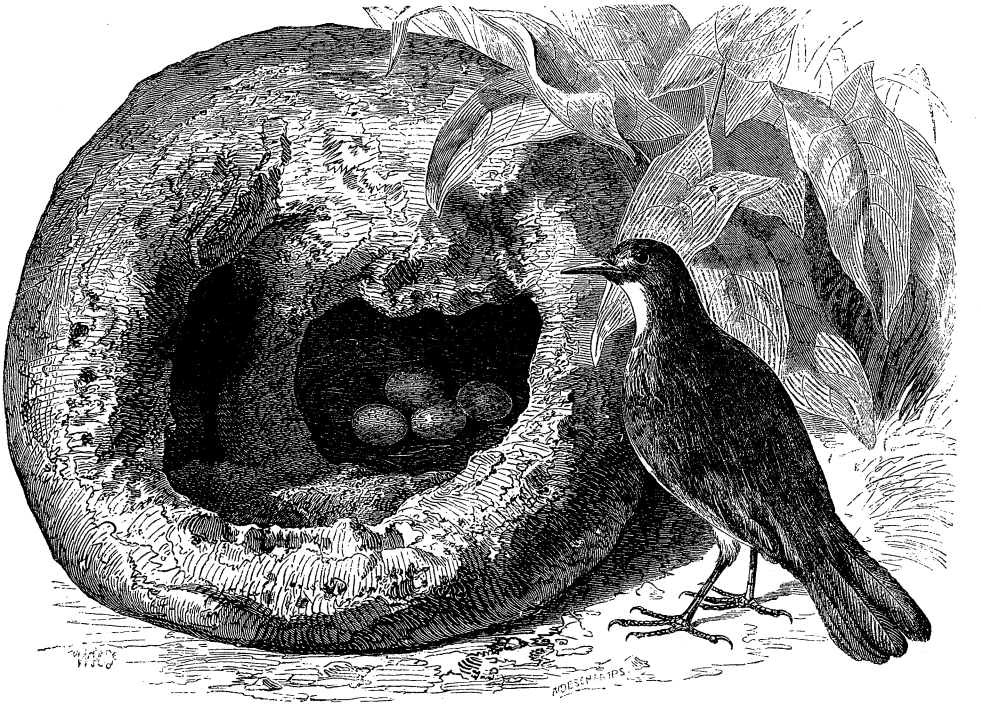
Another species peculiar to New Zealand is the *Pogonornis cincta*, which is remarkable for the great length of the tufts of feathers over the ears; these are erected when the bird is alarmed, and give it a very singular appearance.

A remarkable Australian species is the FRIAR-BIRD, *Tropidorhynchus corniculatus*, which has the head and neck bare of feathers, and a curious tubercle at the base of the bill. Its voice is loud and very singular, some of its notes having a certain degree of resemblance to particular words, and several of its colonial names, such as *Poor Soldier*, *Pimlico*, and *Four-o'clock*, have been derived from these notes. Its name of Friar-Bird alludes to its bare head, and the same character has obtained for it the denominations of the *Monk* and the *Leather-head*.

The *Wattled Honey-Eater* has a long wattle hanging down from each ear; its note is described as very harsh and disagreeable, resembling the noise made by a person vomiting; the native name, *Goo-gwar-ruck*, is said to be an imitation of it. This is the *Philedon Goruck* of Cuvier.

Another group, that of the *Myzomelinæ* or *Honey-Creepers*, is distinguished from the preceding by having the third and fourth quills longest. In their habits and mode of life they resemble the true honey-eaters.

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THE HORNERO OVEN-BIRD.

THE FURNARINÆ OR OVEN-BIRDS.

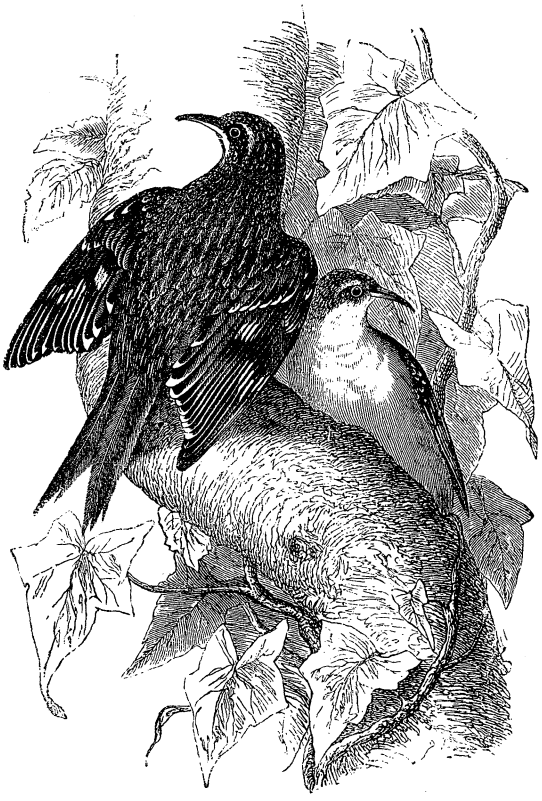
This group of small birds is very generally distributed over the continent of South America, and some species occur in the West Indian Islands. Their food consists principally of insects, which they take both upon trees and bushes, and on the ground, where they run and walk with great ease. They also occasionally feed on seeds. The species of the genus *Cinclodes*, inhabiting the west coast of South America, frequent the sea-shore, where they feed partly on small crabs and mollusca. Mr. Darwin says they are sometimes seen on the floating leaves of the *Fucus gigantеus*, at some distance from the shore. A species of this genus, found in the Malouine Islands, described by Lesson under the name of *Furnarius fuliginosus*, is said to be so tame that it may be almost touched by the hand; and Pernetty, a French voyager, states that it will almost come and perch upon the finger. He adds, that in less than half an hour he killed ten of them with a little stick, and almost without changing his position. This species is five and a half inches long, and of a brown color, with yellow and brown stripes on the neck.

The Hornero Oven-Bird of Buenos Ayres, *F. rufus* of Vieillot, *Merops rufus* of Gmelin, which is typical of the true Oven-Birds, is six to seven inches long, of a bright russet color, and builds a very remarkable nest. This is constructed of clay, straw, and dried herbage of different kinds, in the form of an oven, about ten or twelve inches in diameter, and with walls about an inch thick. The entrance is placed on one side, and the interior is divided into two chambers by a partition, the eggs being laid in the inner one. This curious nest is usually placed in a very exposed situation, as, for instance, on the branch of a tree or the top of a paling. In the construction of it, both the male and female labor in concert, each bringing a pellet of earth of the size of a walnut, and depositing it in its place. Such is the energy of these little architects, that the nest is often built in two days. This bird is said to be an object of veneration with the inhabitants of La Plata.

The Brown Oven-Bird resembles the preceding.

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THE CERTHINÆ OR CREEPERS.



THE COMMON CREEPER OF EUROPE.

Beside the true Creepers, some naturalists have included various other analogous genera, such as the *Soui-Manga*, *Guitguit*, *Dicæum*, *Nectarinia*, *Melithreptus*, *Furnarius*, &c., under the name of *Certhiadæ;* we shall notice under the term *Certhinæ* only the true Creepers.

Genus CERTHIA: *Certhia.*—This includes the COMMON CREEPER or TREE CLIMBER—*Grimpereau* of the French; *Kleinste Baum-Häcker* of the Germans; *Piccio Rampichino* of the Italians—*C. familiaris:* this has a bill slender, and curved; length six and a half inches; head and neck above, streaked with black and yellowish-brown; a white line above each eye; back and rump tawny; coverts dusky brown and yellowish-white; breast and belly silver-white. It is a most restless and active little bird, ever on the alert, and climbing up and about the trunks and branches of trees, intent on picking up its insect food. But even where it is common it is not easily seen, for its activity in shifting its position makes it very difficult to follow it with the eye. At one instant it is before the spectator, and the next is hidden from his view by the intervening trunk or branch, to the opposite side of which it has passed in a moment. The toes are so contrived that the bird at will can remove their position; the tail feathers at the ends are bare, and operate as a support; these are beautiful adaptations to the peculiar motions of the bird. Its note is monotonous, and often repeated. It builds its nest in a hole of a decayed tree; this is formed of dry grass, lined with small feathers, in which six or eight eggs are deposited. While the female sits she is regularly fed by the male bird. It is found throughout the continent of Europe, migrating in October to the southern parts, but is permanent in Great Britain.

The AMERICAN BROWN CREEPER, *C. Americana*, is five and a half inches long; upper part of the head deep brown; back brown; both streaked with white. This has been supposed to be the same as the European creeper, but it is now held to be distinct. Wilson thus describes it: "In winter it associates with the small spotted woodpecker, nuthatch, titmouse, &c., and often follows in their rear, gleaning up those insects which their more powerful bills had alarmed and exposed; for its own slender, incurvated bill seems unequal to the task of penetrating into even the decayed wood; though it may into holes, and behind scales of the bark. Of the titmouse, there are, generally present, the individuals of a whole family, and seldom more than one or two of the others. As the party advances through the woods from tree to tree, our little gleaner seems to observe a good deal of regularity in his proceedings; he alights on the body near the root of the tree, and directs his course, with great nimbleness, upward to the higher branches, sometimes spirally, often in a direct line, moving rapidly and uniformly along, with his tail bent to the tree, and not in the hopping manner of the woodpecker, whom he far surpasses in dexterity of climbing, running along the lower side of the horizontal branches with surprising ease. If any person be near when he alights, he is sure to keep the opposite side of the tree, moving round as he moves, so as to prevent him from getting more than a transient glimpse of him. The best

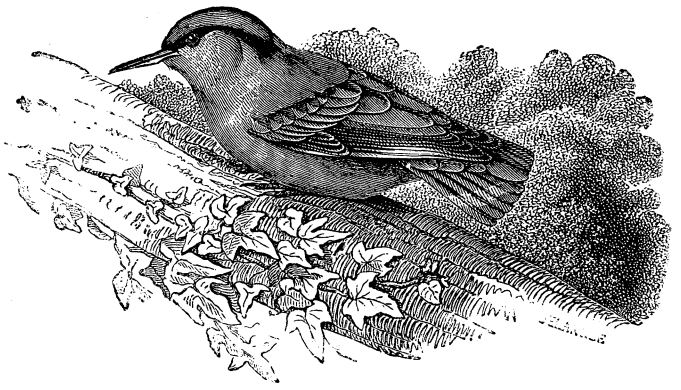
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method of outwitting him, if you are alone, is, as soon as he alights and disappears behind the trunk, to take your stand behind an adjoining one, and keep a sharp look-out twenty or thirty feet up the body of the tree he is upon, for he generally mounts very regularly to a considerable height, examining the whole way as he advances. In a minute or two, hearing all still, he will make his appearance on one side or other of the tree, and give you an opportunity of observing him. These birds are distributed over the whole United States, but are most numerous in the Western and Northern States; their haunts are in the depths of the forests, and in tracts of large timbered woods, where they usually breed, visiting the thicker settled parts of the country in fall and winter."

The *C. albifrons* is found in Texas; it is five and a quarter inches long, dark brown spotted.

The WALL-CREEPER of Europe, *Tichodroma muraria*, seeks its insect food on rocks and in walls; it is chiefly found in the mountainous parts of Southern Europe; it is permanent though rare at Rome, being sometimes seen on the exterior walls of St. Peter's.

The TREE-CREEPERS, *Dendrocolaptinæ*, found in the vast forests of South America, resemble the species we have described; the form of the bill, however, is variable, in some cases being very long and bent downward. The *Synallaxinæ* are an allied group, but which not only devour insects upon the trees, but worms and snails on the ground. They are remarkable for the large size of their nests, those of one species measuring three or four feet in length.



THE COMMON EUROPEAN NUTHATCH.

THE SITTINÆ OR NUTHATCHES.

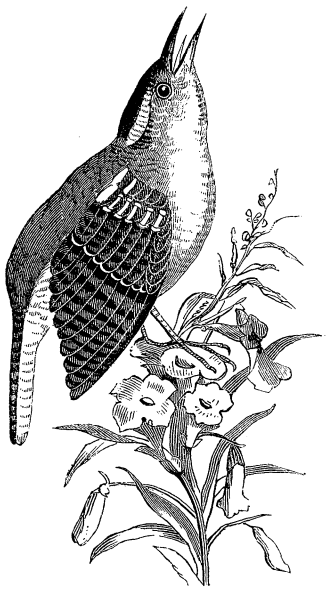
Genus SITTA: *Sitta.*—This includes several species. The COMMON EUROPEAN NUTHATCH—the *Pic Maçon* of the French, and *Blauspecht* of the Germans—*S. Europœa*, is a small bird, five inches long, blue-gray above, below rufous-brown. It runs with facility up and down the branches and trunks of trees, its head often down, but having no assistance in this from its tail-feathers. It sleeps with the head down, and generally alights in that position. It is almost constantly in motion, its food consisting of berries, insects, larvæ, and nuts. It derives its name from the *hatches* or *hammerings* which it makes on nuts, either for obtaining insects or the kernels. Its call in the spring is a clear, shrill whistle. The nest is made with a few dry leaves in the hole of a tree. If the hole is too large the bird reduces it by plastering up a part with mud. The eggs are five to seven in number. This bird is common throughout Europe.

Other foreign species are the *S. rupestris*, *S. Syriaca*, *S. Uralensis*, and *S. Asiatica;* there are also closely allied species in the Indian Archipelago and Australia.

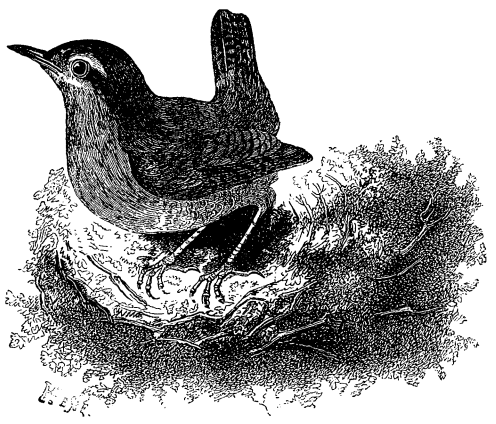
The WHITE-BREASTED NUTHATCH, *S. Carolinensis*, is five inches long; the head and back of the neck are glossy black; the back bluish-black; beneath white. It is found from Mexico to Maine, and is one of the birds that enliven our forests after the cold season has commenced and other birds have departed. It feeds on spiders, insects, larvæ, &c.

Other American species are the RED-BELLIED NUTHATCH, *S. Canadensis;* the BROWN-HEADED NUTHATCH, *S. pusilla;* and the CALIFORNIA NUTHATCH, *S. pigmœa.*

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THE GREAT CAROLINA WREN.



THE COMMON EUROPEAN WREN.

THE TROGLODYTINÆ OR WRENS.

This family includes a number of small, lively, familiar birds, some of them living around the habitations of man, and feeding upon insects and seeds.

Genus TROGLODYTES: *Troglodytes.*—This includes several species: the COMMON WREN of Europe—*Roytelet* of the French; *Fiorracino* of the Italians; *Cutty*, *Katy*, or *Kitty-Wren* of the English—*T. Europœus*, is an active, lively little bird, and appears, in Europe, to share with the robin in the affections of the country people. It frequents hedges, gardens, and bushy places, flitting from bush to bush with a direct flight, and feeding principally upon insects of various kinds, and also occasionally upon seeds and fruits. In spring and summer the male has a very sweet song, which is exceedingly loud and rich, especially when we consider the smallness of the pipe producing it. These birds are very familiar, and seek to be near the habitations of man, although they do not exhibit the same degree of confidence as the robin, but generally conceal themselves very quickly when approached too closely. Nevertheless, in the winter, when cold weather renders it somewhat difficult to keep up the vital heat in such a diminutive body, these birds often roost in cow-houses, for the sake of the warmth generated by the cattle. Most of them, however, shelter themselves in holes at this season, roosting in considerable numbers together, so as to keep up the heat by close packing. For the same purpose they often frequent their nests of the preceding summer; and it has even been said by some authors that the male occupies himself while the female is sitting, with preparing several nests, to afford shelter to the brood in the coming winter.

The wrens pair about the middle of the spring, and early in April commence the construction of their nests. These are placed in very various situations, but principally in holes and crevices in walls, banks and trees, and also in thatched roofs, amongst climbing plants, or even on the branch of a tree. They are made of various materials and lined with feathers: the number of eggs is seven to twelve. It is calculated that these birds bring food to their young ones two hundred and seventy-eight times in a day, with an insect each time. They produce two broods in a season. This species is common throughout Europe, and permanent in France and England and the contiguous countries.

The AMERICAN HOUSE-WREN, *T. œdon*, or *T. fulvus*, is migratory in the United States, arriving from the South early in May. It is brown, banded with dusky; its length is about four inches; it builds its nest sometimes in the wooden cornice under the eaves, or in a hollow

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cherry-tree; or frequently in small boxes, fixed on the top of a pole in or near the garden, to which latter he is extremely partial, for the great number of caterpillars and other larvæ with which it constantly supplies him. If all these conveniences are wanting, he will put up with an old hat nailed on the weather-boards, with a small hole for entrance; and, if even this be denied him, he will find some hole, corner, or crevice about the house, barn, or stable, rather than abandon the dwellings of man. Wilson tells us that in the month of June a mower hung up his coat under a shed, near a barn; two or three days elapsed before he had occasion to put it on again; thrusting his arm up the sleeve, he found it completely filled with some rubbish, as he expressed it, and, on extracting the whole mass, found it to be the nest of a wren completely finished, and lined with a large quantity of feathers. In his retreat he was followed by the little forlorn proprietors, who scolded him with great vehemence for thus ruining the whole economy of their household affairs. The eggs are six or seven, and sometimes even more, of a red-purplish flesh-color, innumerable fine grains of that tint being thickly sprinkled over the whole egg. They generally raise two broods in a season. This species has a very merry, rollicking song, and displays great antipathy to cats, especially those which venture near their nests. They are exceedingly useful to man, on account of the immense number of insects which they destroy.

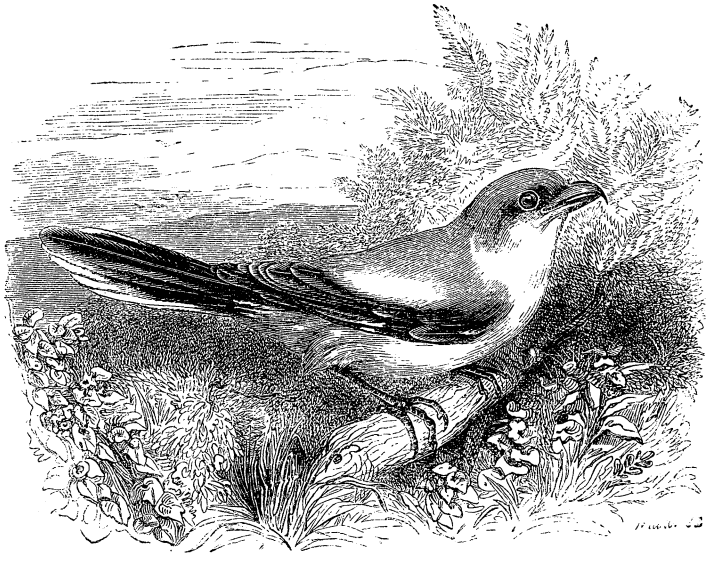


THE EMU WREN.

Other American species are the GREAT CAROLINA MOCKING-WREN, *T. Ludovicianus*, five and a half inches long; noted for its extraordinary musical powers, displayed in imitating various other feathered songsters, and found from New York to Florida; the WOOD WREN, *T. Americanus*, resembling the house wren, and found from Maine to Carolina; the COMMON WINTER WREN, *T. hyemalis*, closely resembling the European wren, and once erroneously supposed to be identical with it; BEWICK'S WREN, *T. Bewickii*, five inches long, and found in Louisiana; the ROCKY MOUNTAIN WREN, *T. obsoletus*, found on the Arkansas River; the MARSH WREN, *T. palustris*, four and a half inches long, and found in the Middle States in summer; the SHORT-BILLED MARSH WREN, *T. brevirostris*, found in summer from Massachusetts to the Southern States; the WHITE-THROATED WREN, *T. Mexicanus*, a Mexican species, five and a half inches long, and recently observed in California; and PARKMAN'S WREN, *T. Parkmanii*, found on the Columbia River. Of all these species the House Wren is the only one that seeks familiarity with man.

Genus STIPITURE: *Stipiture*—This includes, among nearly a dozen other closely-allied Australian birds, the EMU WREN, *S. malachurus*, called *Waw-gul-jelly* by the natives of New South Wales, where it is found. It haunts marshy districts, is shy and recluse, has short wings ill adapted for flight, runs very fast, is very active, often carrying its tail erect and sometimes retroverting it in a ludicrous manner. The body of this bird is about two and a half inches, and the tail three times as long. This consists of six spreading feathers, the barbs of which are of a loose structure, like the feathers of the emu, whence the popular name of the bird. The nest is ball-shaped, and is placed in a tuft of grass; the eggs are usually three.

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THE GREAT BUTCHER-BIRD.

DENTIROSTRES.

The leading characteristic of this group consists in the presence of a distinct notch on each side of the extremity of the upper mandible, which is also usually more or less hooked. The tarsi are generally slender, and covered with broad scales, as are also the toes, which are usually long, and frequently armed with curved and acute claws. The outer toe is always more or less united with the middle one, and this is also the case in some instances with the inner toe. These birds are amongst the most predaceous of the passerinæ: the nourishment of the greater proportion consists principally of insects; some of them, however, capture and devour small vertebrated animals. Berries and fruits likewise constitute a part of their food, but they appear very rarely to eat seeds. They are all furnished with the singing apparatus at the lower larynx, and it is to these birds that our sweetest and most celebrated songsters belong. The divisions of this entire group are as follows: the LANIIDÆ, including the *Shrikes;* the AMPELIDÆ, including the *Piprinæ* or *Manakins*, *Drongo Shrikes*, and *Campephaginæ* or *Caterpillar-Eaters*, *Gymnoderinæ* or *Fruit-Crows*, *Umbrella-Bird*, *Bell-Bird*, *Chatterers*, and *Cotingas;* the MUSCICAPIDÆ, including the *Fly-Catchers*, *Tityrinæ* or *Becards*, *Tyrant Fly-Catchers*, *Alectrurinæ* or *Cock-Tails;* the TURDIDÆ or MERULIDÆ, including the *Bulbuls*, *Orioles*, *Babblers*, *True Thrushes*, *Ant-Thrushes*, and *Ouzels;* the WARBLERS, including the *Wagtails*, *Pipits* or *Titlarks*, *Bush-Creepers*, *Titmice*, *Robins*, *Wheat-Ears*, *Redbreasts*, *Shamas*, *Indian Robin*, and *Bluebird;* the TRUE WARBLERS, including the *Nightingales*, *Tailor-Birds*, &c.

THE LANIIDÆ OR SHRIKES.

In this first family, the bill is elongated, strong, straight, and compressed, with the tip of the upper mandible more or less hooked, and armed on each side with a tooth; the base of the bill is usually as high as broad, and the gape is furnished with bristles, of which about five spring from each side of the base of the upper mandible. The wings are of moderate size; the tail is long and rounded; the tarsi are stout, usually elongated; the hind toe long, broadly padded beneath, and the claws are long, curved, and very acute. The strong hooked bill and curved claws of these birds give them a very well-marked resemblance to the raptorial birds, and the similarity is almost equally striking in the habits of many of the species. They not only prey upon the insects, worms and mollusca, which constitute the principal part of the animal food of the passerine birds, but also frequently attack and destroy small birds and quadrupeds. This resemblance led Cuvier to place the shrikes at the head of the passeres, close to the raptorial birds; and Lin-

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THE FISCAL SHRIKE.

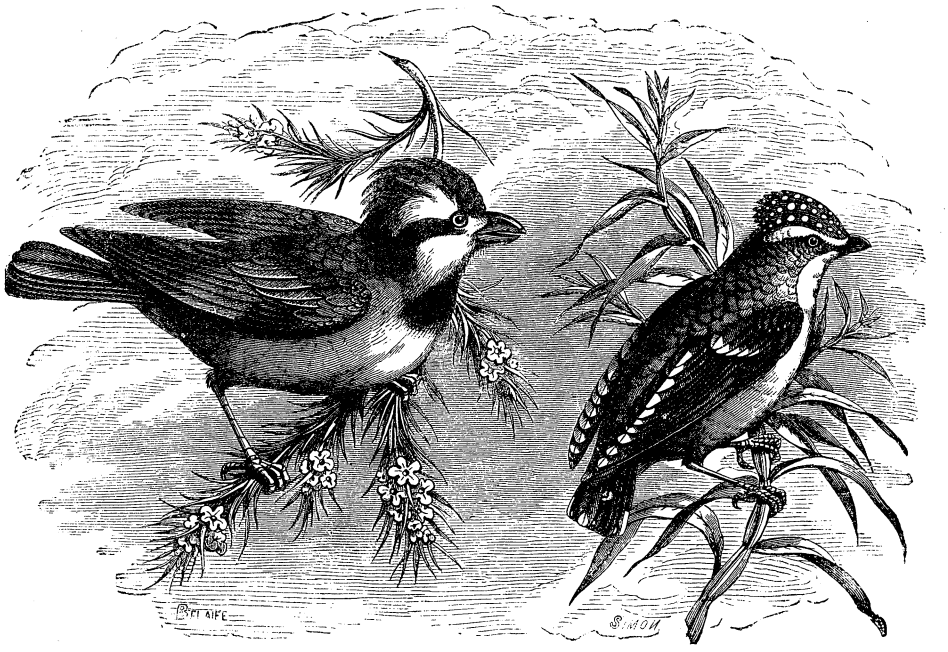
næus and some other authors went still further, and included these birds with the hawks and owls in a single order. They form only two divisions—the *Laniidæ*, or shrikes, and the *Thamnophilinæ*, or bush-shrikes.

Genus SHRIKE: *Lanius*.—This includes the GRAY SHRIKE, or GREAT BUTCHER-BIRD—*Pie Griéche* of the French, *Grossere Neuntoder* of the Germans—*L. excubitor*, the largest and most common species in Europe. It is about nine inches long; the upper parts of a light ash-gray; the wings, tail, and a band around the eye, black; the lower parts white. Its cry is *troui, troui*, which it repeats constantly, while it perches upon the tall trees. It is a vigorous and courageous bird, driving off the crows from its nest, and feeding upon insects which it takes on the wing, and upon mice, moles, and small birds. It has the habit, in common with the other species, of sticking its prey—such as grasshoppers, beetles, birds, mice, &c.—upon thorns, that it may pull them to pieces more easily. Hence these birds are popularly called *Butcher-Birds;* also *Nine-Killers*, from a popular belief that they kill and stick up nine creatures every morning, before beginning to devour their meal. This species builds its nests in trees, and lays five or six eggs. It is stationary in southern Europe. Bechstein says: "The call of the shrike is like the *gihr! gihr!* of a lark. Like the nutcracker, he imitates many single notes, but does not succeed in the song of other birds. His own flute-like tone is very beautiful, resembling the whistling of the gray parrot. In producing it, his throat is distended like that of the tree-frog. It is to be regretted that he sings only in pairing time—from March to May—and that the song is interrupted by harsh and croaking passages. Both sexes sing. The bird might possibly be taught to speak, as it sometimes utters notes closely resembling the human voice."

"All small birds have an antipathy to the shrike, betray anger, and utter the moan of danger when it approaches their nests. I have often heard this signal of distress, and cautiously approaching to learn the cause, have frequently found that this butcher-bird occasioned it. They will mob, attack, and drive it away, as they do the owl, as if fully acquainted with its plundering propensities. Linnæus attached to it the trivial epithet of '*Excubitor*,' a sentinel; a very apposite appellation, as this bird seldom conceals itself in a bush, but sits perched upon some upper spray, or in an open situation, heedful of danger, or watching for its prey."

The RED-BACKED SHRIKE, *L. collurio*, is a bird of passage, spending the winter in Asia, and arriving in Europe in May. It is seven and a half inches long, and is the most common species. It is generally seen in pairs, frequenting hedge-rows and the borders of woods. It is called *Ecorcheur*, or *Flayer*, by the French. The other foreign species are, the ITALIAN SHRIKE, *L. minor*, eight inches long, found in the south of Europe; the WOODCHAT SHRIKE, *L. rutilus*, seven inches long, common in all Africa, and visiting the south of Europe in summer; the BACBACKIRI

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THE CRESTED PARDALOTTE. (See page 117). THE FALCONELLE (*F. frontatus.*)

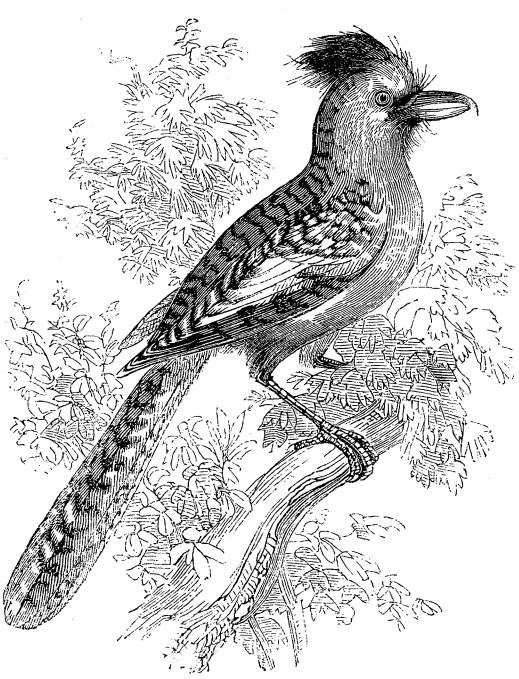
Shrike, *L. Bacbackiri*, an African species, resembling the thrush in appearance; and the Fiscal Shrike, *L. collaris*, also found in Africa, and resembling the gray shrike in appearance. In predaceous habits the last surpasses all the other species.

The Northern Shrike or Great American Shrike, *L. Septentrionalis*, is an American species, nine inches long, and so closely resembling the European gray shrike as to have long been esteemed identical; but it is now believed to be distinct. Wilson says: "The form and countenance of this bird bespeak him full of courage and energy; and his true character does not belie his appearance, for he possesses these qualities in a very eminent degree. The species is by no means numerous in the Middle States; though most so during the months of November, December, and March. Soon after this, it retires to the north, and to the higher inland parts of the country to breed. It frequents the deepest forests; builds a large and compact nest in the upright fork of a small tree, composed outwardly of dry grass, and whitish moss, and warmly lined within with feathers. The female lays six eggs, of a pale cinereous color, thickly marked at the greater end with spots and streaks of rufous: she sits fifteen days; the young are produced early in June, sometimes toward the latter end of May, and during the greater part of the first season are of a brown ferruginous color on the back." The habits of this species in respect to their food, and the impaling of insects, mice, and birds on thorns, are the same as those of the European Gray Shrike.

The Loggerhead Shrike, *L. Ludovicianus*, is somewhat smaller and darker colored than the preceding, and is confined to the Southern States. It is protected on the rice plantations, because of the great number of mice it destroys. It sits, for hours together, on the fence, beside the stacks of rice, watching like a cat; and, as soon as it perceives a mouse, darts on it like a hawk. It also feeds on crickets and grasshoppers. Its note, in March, resembles the creaking of a sign-board in windy weather. It builds its nest generally in a detached bush, much like that of the mocking-bird. Two other species are mentioned as belonging to the high northern regions of our continent: the *L. excubitorides*, and *L. elegans*. Most of the shrikes appear to have considerable powers in imitating the calls of other birds.

Several closely allied species of shrikes are found in the East Indies and South America. There are also several genera of *Thamnophilinæ* or *Bush-Shrikes*. The typical species is the *T. Vigorsii*, found in South America, and called *Batara* by Azara. It is the largest of the shrikes,

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THE BATARA.



THE MAGPIE SHRIKE.

being thirteen inches long. The upper parts are black, broadly banded with fulvous; beneath it is whitish brown. Other species belong to Africa and Asia.

Genus BETHYLUS: *Bethylus.*—This includes the MAGPIE SHRIKE, *B. picatus—Lanius picatus* of Latham—found in Guiana and Brazil. It resembles the magpie in appearance.

In Australia, there are three genera of shrikes: those of the *Genus* FALCUNCULUS, feed on insects, in order to obtain which they strip the bark off the trees with their strong bills. The FALCONELLE, *F. frontatus*, is of the size of a sparrow, and in its form and markings resembles the great titmouse of Europe. Another Australian species, the *Oreoica cristata*, is distinguished for hopping about on the ground, which is rare with other members of this genus. It has a sort of ventriloquial power of voice, commencing a song in a low tone, which seems to come from a great distance; but it gradually increases in strength, till the listener at last discovers that the bird is very near at hand, perhaps immediately over his head. This kind of ventriloquial power, however, by which the hunter is often deceived, is possessed by many other birds.

THE AMPELIDÆ OR CHATTERERS.

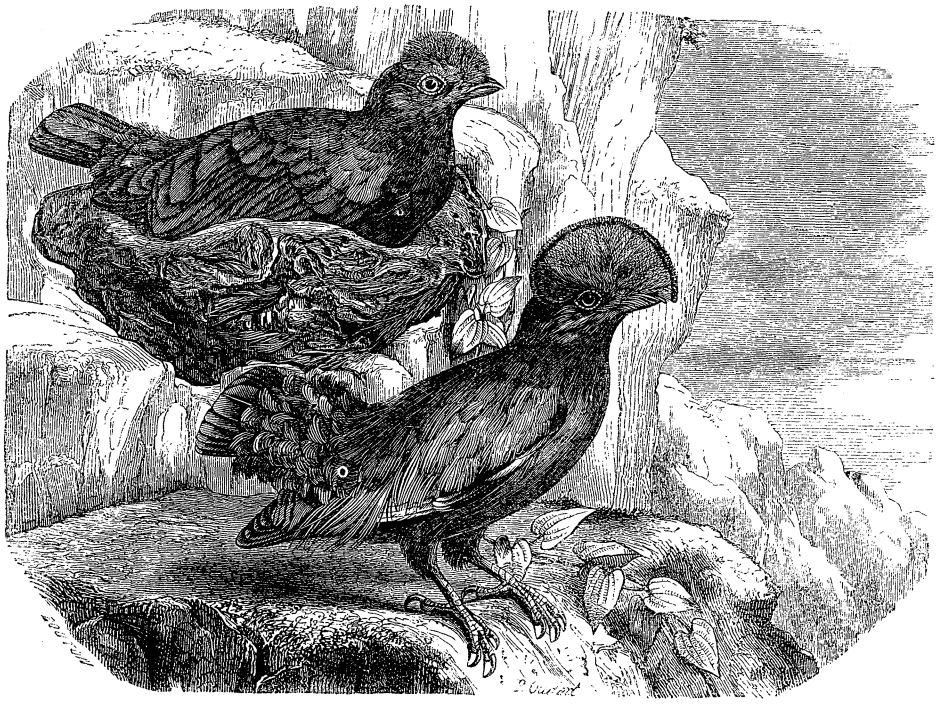
The *Ampelidæ* embrace several groups, resembling the True Chatterers in certain respects, and hence they are associated with them. For the most part they belong to the warm parts of the world, and live on insects.

THE PIPRINÆ OR MANAKINS.

This group is composed of numerous beautiful birds, mostly of small size, all of which, except the *Calyptomena viridis*, found in Sumatra, inhabit the tropical regions of the American continent. They live in small flocks, in the hot, moist forests which spread over those torrid countries, and feed upon insects and fruits. They are exceedingly active in their movements.

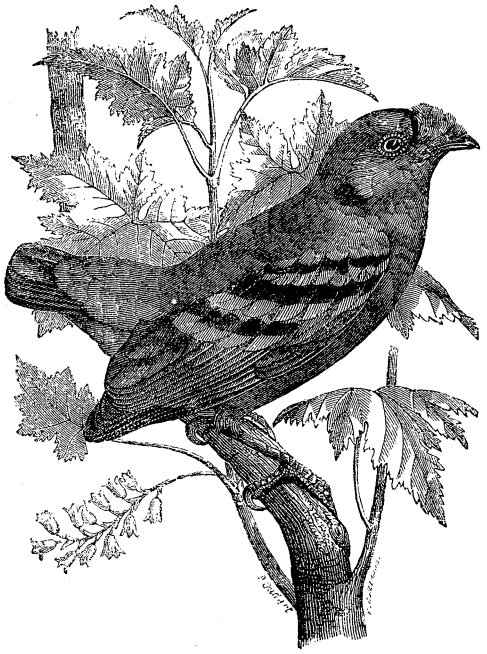
Genus RUPICOLA: *Rupicola.*—Of this is the COCK OF THE ROCK, *R. aurantia*, about the size of a pigeon, and of a fine orange color, with the quills of the wing and tail blackish. It is distinguished by a singular crest of feathers arranged in two planes, rising from the sides of the head so as to meet in the middle, forming a semicircular wedge-like ornament, which projects in

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THE COCK OF THE ROCK.

front over the bill. The upper tail-coverts are also remarkably elongated, curved, and decomposed' so as to form an elegant tuft upon the rump. This bird is found in Guiana, where it frequents the rocky shores of the streams; hence its common name. It forms a nest of fragments of wood and dry grass in the holes of the rocks, and lays two white eggs. A second species, *R. Peruviana*, also of a bright orange color, has been found in Peru and Mexico.



THE GREEN CALYPTOMENA.

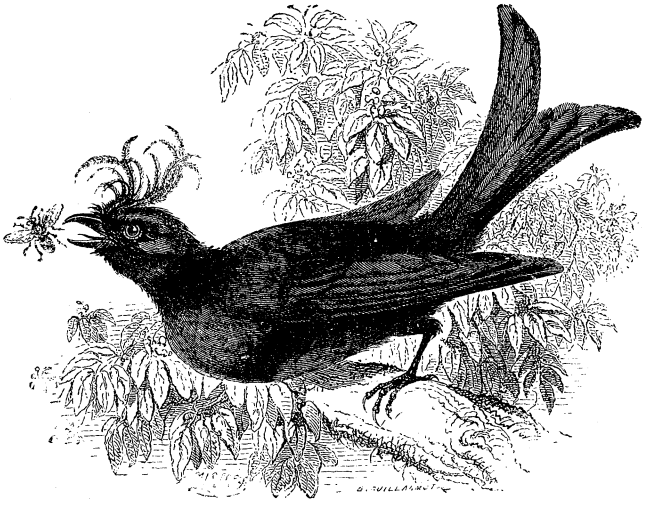
Genus CALYPTOMENA: *Calyptomena.*—This includes the GREEN CALYPTOMENA, *C. viridis*, of the color of the green leaves among which it lives, and therefore seldom seen; found in Java and Sumatra.

Other species of Piprinæ are South American, and much smaller birds; the *Calyptura cristata*, is red, olive, and yellow; size of a sparrow: the *Pipra strigilata*, has the head bright red and upper parts green; size of a wren: *P. aureola*, of the same size; color red, back wings and tail black: the *Metopia galeata*, black, head and neck red: the CRESTED PARDALOTTE, *P. cristatus*, has a red crest, upper parts olive-green; three inches long; above gray, undulated with yellow; rump, throat, and breast yellow. This species lives along the borders of small streams that dash down the rocks of the higher mountains. These remote places are infested with a gigantic kind of spider, which often attacks this little bird suddenly, with his poisonous fangs, in the throat, and it instantly falls a prey to the insidious destroyer.

The THICK-HEADS, or *Pachycephalinæ*, are

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closely allied to the manakins, but differ from them in the structure of their feet, the outer toe being united to the middle one at the base. They are found in both hemispheres, but are most abundant in Australia and Polynesia. They are small birds, inhabit woods and forests, and feed on fruits, seeds, buds, and insects. One of the Australian species, *Eopsaltaria Australis*, is called the YELLOW ROBIN by the colonists; another species found in Van Diemen's Land—the *Pardalotus punctatus*, called the DIAMOND-BIRD, on account of the spots on its head—excavates a horizontal passage two feet long in the trunk of a tree, at the end of which it builds its nest. This bird frequents the gum-trees, and freely approaches the habitations of man. Several species of the genus *Leiothrix* are found in India; they feed on insects, and for the purpose of seizing these, are often occupied in carefully examining the opening buds of the trees, whence they are called *Bud Hunters*.



THE CRESTED DRONGO.

THE DICRURINÆ OR DRONGO SHRIKES.

These approach the true shrikes; they are found only in the eastern hemisphere, and are particularly abundant in the East Indies and the islands of the Asiatic Archipelago. Many of them are exceedingly beautiful birds; their average size is about that of a thrush, and they appear to migrate from one part of the country to another with the monsoons. The commonest of the Indian species, the *Dicrurus macrocercus*, has received the name of KING CROW, from its habit of persecuting the crows, which it follows with the greatest perseverance and clamor, pouncing down upon them every now and then, but apparently seldom striking them. The principal food of this and most of the species consists of insects, especially grasshoppers, for which they watch from some elevated perch, and on perceiving one, immediately dart down upon it. For this purpose they not unfrequently establish themselves on the backs of cattle, sheep and goats, whilst these animals are grazing. They fly with great rapidity, and often capture insects on the wing. Some of the species appear only to have a harsh, screaming note, but others are said to be charming songsters; and one species, the *Dicrurus Paradiseus*, has received the Hindoo name of "*Huzar Dustan*," or "*Bird of a thousand tales*," from a belief that it is able to imitate the song of all other birds.

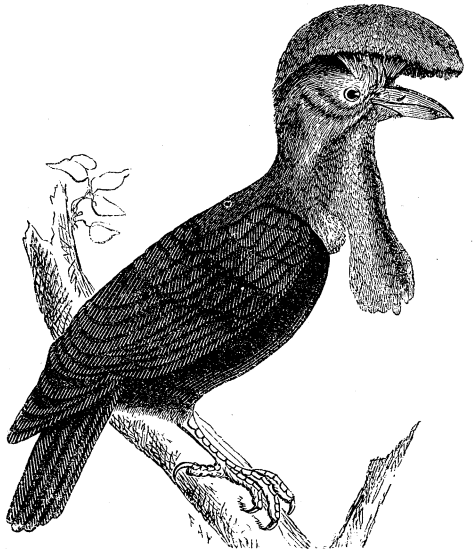
The Dicrurinæ live in the jungles, and build their nests, which are composed of grass, twigs, moss, and lichen, in the forks of trees. Their architectural powers appear to be very variable, as the nests of some of the species are described as carelessly put together, while others are said to be very neat. The eggs are from three to five in number, of a white or whitish color, usually spotted with reddish-brown.

The CRESTED DRONGO, *Lanius forficatus* of Gmelin, is an African species, black, with a green reflection, of the size of a thrush; they unite in flocks of twenty or thirty, and in attacking the bees present a very animated appearance, their cry of *pia*, *griach*, *griah*, being constantly repeated.

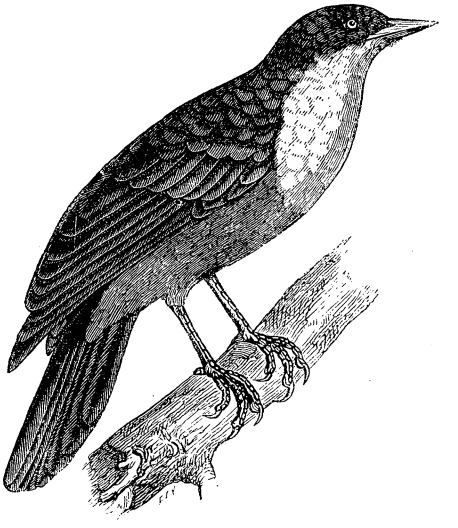
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THE CAMPEPHAGINÆ OR CATERPILLAR-EATERS.

These birds, like the Dicrurinæ, are almost exclusively confined to the warmer parts of the Old World—Africa, and India—only the single genus *Ptilonogonus* being found in America. They have the bill short, the claws much curved, and live principally in woods and forests; but some of the species are also found about hedges and gardens. They are seen either singly or in small flocks, hopping about upon the trees, and prying inquisitively into every part of the foliage in search of their food, which consists almost entirely of soft insects, and especially of caterpillars. They also pick up ants and beetles, and in pursuit of these are not unfrequently seen upon the ground; fruits and berries are said also to form part of the diet of some of the species. The nests are built high up in trees; they are of small size, and composed of lichens, roots, and thin stalks. The eggs are few in number, sometimes only two, of a pale color, with brown streaks.



THE UMBRELLA-BIRD.



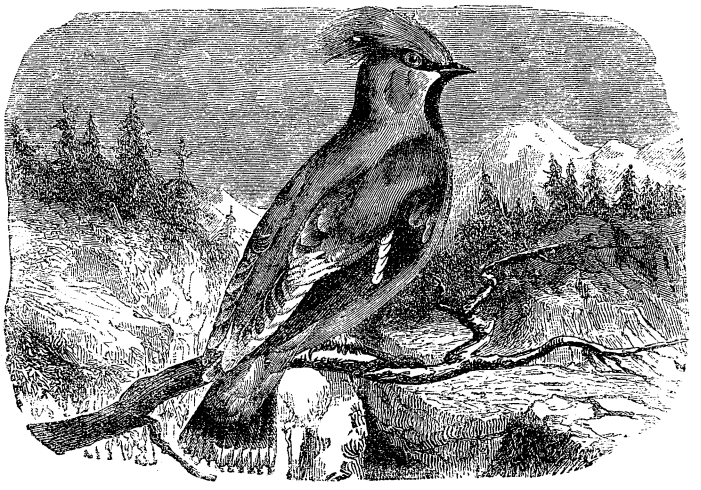
THE BLOODY PAVAO.

THE GYMNODERINÆ OR FRUIT-CROWS.

Another and an interesting group is that of the *Gymnoderinæ* or *Fruit-Crows*, consisting of some remarkable birds, which have been arranged by different authors among the chatterers and the crows. They have a stout, straight, depressed bill, with the ridge of the upper mandible curved, and its tip notched; the wings are long and pointed; the tail of moderate length, and rounded; the claws long, curved, and acute. They are peculiar to South America, and are of considerable size, some of the larger species being equal, in this respect, to our common crows. They feed principally upon fruits, and occasionally on insects. Some of the species have the face or part of the neck bare of feathers, and hence are called *Bald-Heads:* one species, the *Gymnocephalus calvus*, is called the CAPUCHIN BALD-HEAD. Another species, the BLOODY PAVAO, *Coracina scutata*, is fifteen inches long, and is entirely black, with a blood-red cuirass of feathers on the neck and breast, appearing like a bloody wound; it has a cry of *bou*, *bou*, *bou*, which in the deep forests of Brazil sounds like the horn of a herdsman calling his flock. Another species is the renowned UMBRELLA-BIRD, *Cephalopterus ornatus*, of a beautiful glossy black color, giving out bluish reflections; it has a superb tuft of blue, hair-like, curved feathers on the top of the head, and also a plume of blue feathers depending from a fleshy process on the neck. This bird is of the size of a crow, feeds principally on fruits, and has a loud, deep note, whence it is called by the natives *Ueramimbé* or *Piper-Bird*. It is found in the regions of the Rio Negro. Another celebrated species is the ARAPUNGA, or CAMPENERO, or BELL-BIRD, *Arapunga alba*, found in the wild forests of Guiana; it is about twelve inches in length, and of a pure white color. It is dis-

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tinguished by a singular fleshy cylindrical appendage, often furnished with a few small feathers, which rises from the base of the bill. Its voice is peculiar, resembling the deep tolling of a bell. According to Waterton, it may be heard at a distance of nearly three miles during the heat of the day, when most of the feathered inhabitants of those tropical forests are hushed in silence.



THE WAX-WING.

THE CHATTERERS.

The *Ampelinæ* or *True Chatterers* have the gape wide, the bill broad at the base, depressed near the tip, and distinctly notched; they are found in both hemispheres.

Genus BOMBYCILLA: *Bombycilla—Ampelis* of some authors.—Of this there are several species. The EUROPEAN WAX-WING—*Jaseur* of the French; *Garrulo di Boemia* of the Italians; *Gemeine Seidenschwantz* of the Germans; *Silk-Tail* of the English—*B. Garrula*, is known throughout the northern parts of both continents. It is a very handsome bird, about eight inches long, of a general grayish color, with a large patch on the throat and a band on the head of black. The crest on the crown of the head and the lower tail-coverts are brownish-orange; the primary wing-coverts are tipped with white; the primary and secondary quill-feathers are black, tipped with yellow, as are also the quills of the tail; and the tertiaries are brownish-purple, tipped with white. Four of the secondaries, and from one to four of the tertials, according to the age of the bird, are terminated by small horny expansions of the shaft of the feathers, resembling, both in color and texture, red sealing-wax. The name of *Bohemian Chatterer*, commonly applied to this bird, appears to be peculiarly inappropriate, as it is by no means more abundant in Bohemia than in other parts of Europe, and its actual home and breeding-place is probably within the arctic circle. It is a winter visitor to France, England, &c. In Europe it feeds upon the berries of the mountain ash, hawthorn, and ivy, which are all to be found abundantly during the winter upon the plants producing them; in the high northern latitudes of America, to which it is here chiefly confined, though sometimes found as far south as Philadelphia, it eats the berries of the juniper. It also occasionally feeds upon insects, which it captures on the wing in the same manner as the fly-catchers.

The AMERICAN WAX-WING, or CEDAR-BIRD, or CHERRY-BIRD, *B. Carolinensis*, is a familiar bird in all parts of the United States, migrating to the north in summer and the south in winter. It closely resembles the preceding, though it is smaller. It is known in all North America, from Canada to Mexico, and feeds upon different kinds of berries, especially those of the red cedar and cherries, and also upon insects. It breeds in June, sometimes building in the cedars, but more commonly in orchards. The nest is composed of grass, and the eggs, which are three or four in number, are of a dingy bluish-white color, variously spotted with black. When berries are abundant, as in the autumn and the beginning of summer, the birds become very fat, and are then in considerable esteem for the table. They fly in compact flocks of twenty to thirty; the

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term *Chatterer* is wholly inapplicable to them, as they have only a faint chirp, generally uttered as they rise to fly. Nuttall tells a curious instance of politeness which he noticed among them: one having caught an insect gave it to his neighbor; this took it and gave it to another, and he to another, and so it went round for some time before it was devoured.

The JAPANESE WAX-WING, *B. phœnicoptera*, resembles the American species, but is smaller, and is without the wax-like appendages.

THE COTINGAS.

These are considered as allied to the preceding, and comprise several genera, remarkable for the splendor of their plumage. The *Piauhaus*, so called from their cry, live in flocks in South America, and feed on insects. The GREAT PIAUHAU, *Coracias militaris* of Shaw, is entirely purple. The *True Cotingas* inhabit humid places in South America. The SCARLET COTINGA, *Ampelis carnifex*, is seven inches long, scarlet above, and reddish-brown below. The POMPADOUR COTINGA, *A. Pompadora*, is a reddish-purple; the BLUE COTINGA, *A. cotinga*, splendid ultramarine, with a violet breast. Our common bluebird resembles these, and was formerly included in the group.



THE COLLARED FLY-CATCHER.

THE MUSCICAPIDÆ OR FLY-CATCHERS.

In this extensive and interesting family, which closely resemble the shrikes in their habits, the bill is generally straight, broad, and depressed at the base, with the gape wide, and furnished with long, stout bristles springing from the base of the upper mandible. The wings and tail are long, and the legs short and weak, with the toes more or less elongated. They are small birds, feeding for the most part upon insects, which they take upon the wing. They establish themselves in some elevated position, from which they dart off after their prey, returning again to their post to swallow it. The larger species, however, like the Shrikes, are not content with such small game, but make war upon the smaller vertebrate animals. They include five groups, or sub-families, the *Vireos*, the *True Fly-Catchers*, the *Becards*, the *Tyrant Fly-Catchers*, and the *Cock-Tails*.

THE VIREOS OR GREENLETS.

This is a group of small American birds, of which the general plumage is usually more or less tinted with green or olive. They have a short, straight bill, and the bristles of the gape are short and weak; the wings are long and pointed, and the toes of moderate size, the lateral ones being about equal, and both more or less united to the middle one at the base. They migrate from the tropical regions of America—Brazil, Guiana, and the West Indian Islands—to the United States, arriving here about the month of May, and returning southward in August and September. Some of them have an exceedingly sweet warbling note, while the song of others appears to have little merit. They feed almost entirely upon insects, some apparently preferring

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beetles and other hard-skinned species, while others principally devour the small insects which they take on the wing, and others, again, appear to have a predilection for caterpillars, for which they search the leaves of the trees. They also occasionally eat berries. They build their nests sometimes in trees, sometimes in thick bushes, forming them of dry leaves, grass, fibrous roots, moss, and lichens, &c.

Genus VIREO: *Vireo.*—This includes several species, often called *Greenlets.* The RED-EYED FLY-CATCHER or WHIP-TOM-KELLY, *V. olivaceus*, is a very numerous and familiar species, even venturing into parks, gardens, and yards of cities, where it rears its young and sings its song. Wilson says: "In Jamaica, where this bird is resident, it is called, as Sloane informs us, Whip-tom-kelly, from an imagined resemblance of its notes to these words. And, indeed, on attentively listening for some time to this bird in his full ardor of song, it requires but little of imagination to fancy that you hear it pronounce these words, 'Tom kelly, whip-tom-kelly!' very distinctly." But Mr. Gosse, who has furnished us with several excellent works on Natural History, and heard this bird often in Jamaica, states that its notes bear a very close resemblance to the syllables "John-to-whit," pronounced with an emphasis on the last syllable; an evidence of a fact we have before noticed, that two persons, in attempting to write down the notes of birds, rarely give precisely the same syllables.

The other noted species of Vireo are as follows: the WHITE-EYED FLY-CATCHER, *V. Noveboracensis*, a small species, but a loud singer, noted, as Wilson says, for introducing fragments of newspaper into the construction of its nest, whence some of his friends proposed to call the bird the *Politician:* the YELLOW-THROATED GREENLET, *V. flavifrons*, five and a half inches long, and of a greenish-olive color: the SOLITARY GREENLET, *V. solitarius*, four and a half inches long, dusky-olive color: the WARBLING FLY-CATCHER, *V. gilvus*, a pleasing singer: all the preceding common in the United States: the *V. altiloquus*, occasionally visiting Florida, and having some curious notes: the BLACK-HEADED FLY-CATCHER, *V. atricapillus*, recently discovered in Texas, seven and a half inches long, above dark olive-green, below white. To these may be added the *V. Bartrami*, found in New Jersey and Kentucky: the *V. longirostris* of the Antilles: the *V. belli* of the upper Missouri.

THE TRUE FLY-CATCHERS.

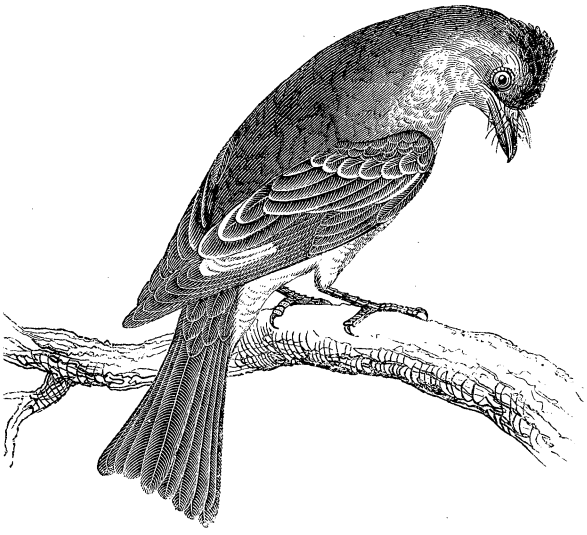
In these the form of the bill closely resembles that of the Vireos; but this organ is rather longer, and has the ridge slightly flattened at first, but curved toward the tip. The gape is furnished with bristles; the wings are long and pointed, and the toes are short, the outer lateral toe being longer than the inner one.

These birds, which exhibit the characteristic habits of the family in their greatest perfection, are pretty generally distributed over both hemispheres, but more especially in the tropical regions. The species which occur in the temperate and colder regions, generally are summer birds of passage.

Genus MUSCICAPA: *Muscicapa.*—This includes the SPOTTED FLY-CATCHER, *M. grisola*, the most familiar and abundant European species, six inches long, of a brownish tint above, with a few dark spots on the head, and dull white beneath; it is common during the summer in England, France, and generally over Europe. In England its nest is usually placed in a hole in a wall, in a faggot stack, or an out-building, but the branches of trees trained against a wall are sometimes selected for its reception. A pair have also been known to build on the head of a garden-rake, which had been accidentally left standing near a cottage; another pair built in a bird-cage; but the most curious instances of caprice in this matter are those of two pairs of these birds which selected street lamp-posts for the purpose of nidification.

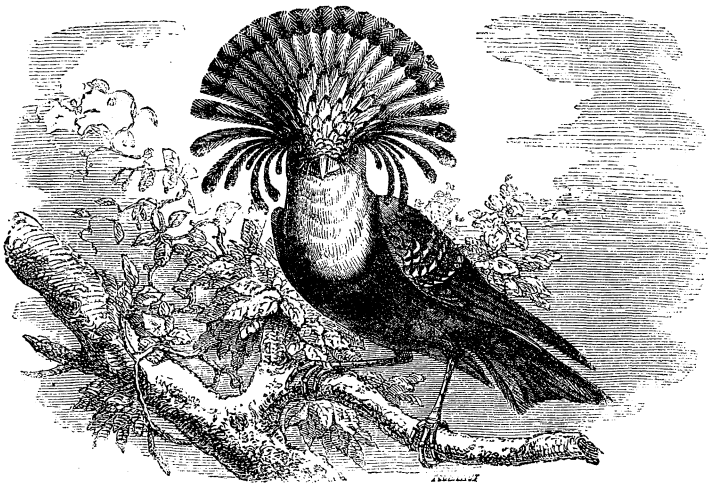
Among other foreign species are the PIED FLY-CATCHER, *M. atricapilla*, common in the south of Europe: called *Bec-figue* or *Fig-Pecker* by the French, because it catches insects on the fig-trees, and, it is said, eats the figs when ripe; the COLLARED FLY-CATCHER, *M. albicollis*, subject to very great changes of plumage; and the *M. scita*, an extremely small species of Southern Africa. The *Crested Gobe Mouche* of Buffon—*M. coronata* of Latham—is a handsome South American species, which is noted for catching butterflies which flutter around the cotton-plants.

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THE PHOEBE BIRD.

There are several species of Fly-Catchers familiarly known in the United States; the PHOEBE-BIRD or PEWEE FLY-CATCHER, *M. nunciola* or *M. fusca*, visits us in summer from the south, its favorite haunts being by streams of water, under or near bridges, in caves, &c. Near such places he sits on a projecting twig, calling out, *pe-wée, pe-wit-titee, pe-wée*, for a whole morning; darting after insects and returning to the same twig; frequently flirting his tail, like the wagtail, though not so rapidly. He is six and a half inches long, of a dusky olive above, lower parts a delicate yellow. On the top of the head the feathers form a loose crest, which is common to many of the family. Other species are the WOOD PEWEE, *M. rapax* or *M. virens*, greatly resembling the preceding: the SHORT-LEGGED PEWEE FLY-CATCHER, *M. phœbe*, a rare species, found in Labrador and the Fur Countries: the GREEN-CRESTED FLY-CATCHER, *M. querula*, or *M. acadica*, a small species, keeping to the woods, and little known: the YELLOW-BELLIED FLY-CATCHER, *M. flaviventris*, found on Long Island: the ARKANSAS FLY-CATCHER, *M. verticalis*—the *chlowu-ish-pil* of the Chinnooks—resembling the king-bird in its habits, greenish-brown above and yellow beneath, with a bright red crest; found on the west of the Rocky Mountains: COOPER'S FLY-CATCHER, *M. Cooperi*, resembling the Pewees, and found in the Atlantic States from Texas to Maine: the ROCKY MOUNTAIN FLY-CATCHER, *M. nigricans*, seven inches long, dark sooty brown above and greenish-white below; found in California and Mexico: TRAILL'S FLY-CATCHER, *M. Trailli*, resembling the wood pewee, found on the Arkansas: the LEAST PEWEE, *M. pusilla*, five inches long, found in Labrador and the fur countries: the SMALL-HEADED FLY-CATCHER, *M. minuta*, found in the Southwestern States; and the AMERICAN REDSTART, *M. ruticilla*, a very lively and handsome species, six and a half inches long, variegated with red, brown and yellow; found throughout the United States.



THE KING OF THE FLY-CATCHERS.

The SAVANNAH FLY-CATCHER, *M. Savana*, is fourteen and a half inches long, including the tail,

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which is deeply forked, and more than twice the length of the body; the back is ash-gray, the rump bluish-black, wings and tail brownish-black, lower parts white; found in the Southern States.

The SWALLOW-TAILED FLY-CATCHER, *M. forficata*, is eleven inches long, the tail long and forked; upper parts gray, lower parts white before and rose-colored behind. Other species are named as found in Texas, as follows: *M. Saya*, *M. Texensis*, *M. Laurentii*, *M. fulvifrons*, *M. Derhami*, *M. belli*, *M. leucomus*, *M. Brasieri*, *M. rubifrons*.

Genus PTILOGONYS: *Ptilogonys.*—This includes TOWNSEND'S PTILOGONYS, *P. Townsendi*, combining somewhat the qualities of the Fly-Catchers and Thrushes; it is eight inches long, of a dull brownish-gray color, and is found on the Columbia River: also the BLACK FLY-CATCHER, *P. nitens*, figured by Cassin, seven and a half inches long, of a glossy black color, with greenish reflections; found in California, Mexico, &c.: the PIPIRY FLY-CATCHER, *P. dominicensis*, eight inches long, and resembling the kingbird; found in Florida.

Genus CULICIVORA: *Culicivora.*—This includes the BLUE-GRAY FLY-CATCHER or GNAT-CATCHER, *C. cœrulea*, about five inches long, and found abundantly in Texas.

Genus FLUVICOLA: *Fluvicola.*—This includes several South American species, as the *F. comata*, *F. nigerrima*, &c.

Genus MUSCIPETA: *Muscipeta.*—This includes the KING OF THE FLY-CATCHERS, the *Todus regius* of Latham, a superb South American species, with a tall transverse crest of reddish-fawn feathers; the body is a deep brown, the breast white spotted with brown. (See p. 123.)

Genus TCHITREA: *Tchitrea.*—This includes the PARADISE FLY-CATCHER of India, *T. Paradisi*, found in the jungles of India, and though its body is but six inches long, has a tail fourteen inches long; its head is also adorned with a crest.



THE SAVANNAH FLY-CATCHER.

There are many other species analogous to these we have described in Africa, Asia, and Australia, some having pleasing songs and some only chirping notes.

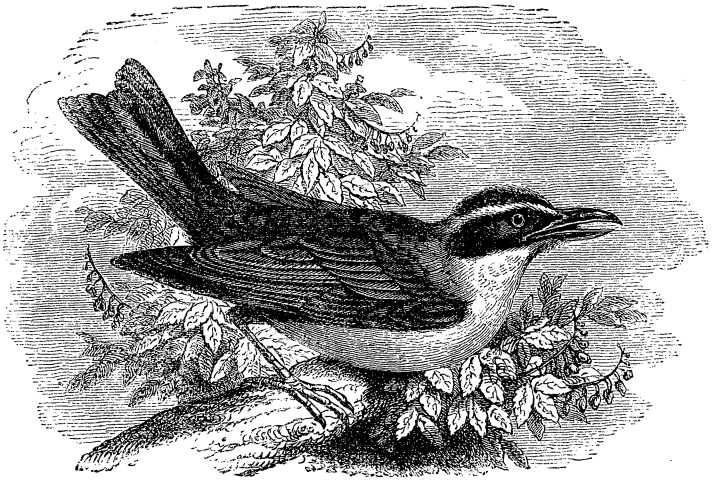
Genus ICTERIA: *Icteria.*—This includes the YELLOW-BREASTED CHAT, *I. viridis*, seven inches long, greenish-olive above; throat and breast yellow; known as a summer visitor throughout the United States, and remarkable for the oddity of its motions and its singular notes, which sometimes resemble the cries of young puppies, and sometimes the mewing of a cat, these being often prolonged into the night.

THE TITYRINÆ OR BECARDS.

This is a small group of birds, closely allied to the fly-catchers, and peculiar to South America and the West Indies. They have a short bill, broad at the base, and suddenly compressed toward the tip. The GRAY BECARD—the *Cayenne Shrike* of Latham—*Psaris Cayennensis*—the type of Cuvier's genus *Psaris*—is generally gray, with the head, wings, and tail, black; it is found in Guiana.

The genus *Langrayen* or *Ocypterus*, consisting of species found in the Asiatic Isles, as well as the genus *Artamia*, the various species of which are confined to the island of Sumatra, are placed by Le Maout contiguous to the Becards.

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THE SPOON-BILL TYRANT FLY-CATCHER.

THE TYRANNINÆ OR TYRANT FLY-CATCHERS.

These are American birds, differing little from the true fly-catchers, except that they have the tip of the bill more strongly hooked; they also resemble the shrikes a good deal in their habits, preying not only upon insects and berries, but some of them also upon small vertebrate animals, including even fishes. Two species are well known in the United States.

Genus TYRANNUS:—*Tyrannus.*—The best known species is the KINGBIRD, *T. intrepidus*, eight inches long, of a slaty ash-color above and white beneath; on the head is a tuft of yellow feathers, capable of being erected into a crest, which circumstance, as well as the despotic authority he exercises over other birds, has given him the names of *Kingbird* and *Tyrant Fly-Catcher.* It arrives in small parties in the United States in the month of April; they then soon pair and begin to build their nests. Before very quiet, the male now becomes exceedingly quarrelsome; and such is his fierceness, that hawks and crows, the bald eagle, and even the great black eagle, dread a rencounter with the dauntless little champion. The kingbird feeds on insects, generally sitting on the tops of fences, posts, or mullein-stalks, till opportunity offers, when he darts upon his prey with infallible aim.



THE TRICOLORED ALECTRURUS.

The CRESTED TYRANT, *T. crinitus*, is somewhat larger than the kingbird, and is found in the United States, from Texas northward; the color is greenish-olive above, and sulphur-yellow beneath; the throat and upper part of the breast ash-color; on the head, the dark brown feathers form a sort of crest.

The SPOON-BILL TYRANT, *Lanius sulphuratus* of Gmelin, found in Brazil, has a large, thick bill, a large head, the upper parts of the body a reddish-brown, the breast yellow, on the top of the head a yellow crest. It is found in Brazil, feeds on butterflies, and is popularly called *Bem-te-veo*, from its habitual cry.

THE ALECTRURINÆ OR COCK-TAILS.

In these birds the bill is broad and depressed at the base, convex toward the point, which is more or less hooked; the nostrils are rounded and exposed; the tail is elongated, compressed, and capable of being raised in a very singular manner, which has caused these birds to be compared to *Little Cocks*, and the scientific name of *Alectrurus* applied to the typical genus may, perhaps, be translated *Cock-tail.* The tarsi are slender,

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and the toes armed with long, curved, and acute claws. These birds are peculiar to South America, and in their general habits resemble the fly-catchers. Many of them perch upon trees and bushes, and thence dash off into the air in pursuit of insects on the wing; others are never seen in the neighborhood of woods, but appear to prefer fields in the vicinity of water, where they rest on the rushes and other aquatic plants. It is in the male only that the great development of the tail above alluded to is seen; the feathers of this part exhibit several peculiarities of structure. The two external feathers have the barbs much broader on one side than on the other, and the two central feathers, which are the most elongated, frequently have the barbs decomposed, and the termination of the shaft naked. They are small birds, the TRI-COLORED ALECTRURUS, *A. tricolor*, being only six inches long.

THE TURDIDÆ OR THRUSHES.

This family, the numerous species of which feed on insects, worms, and fruits, and usually move on the ground by hopping with both feet at once, includes several interesting and well-known groups, as the *Bulbuls*, *Orioles*, *Babblers*, *True Thrushes*, *Ant-Thrushes*, *Warblers*, *Titlarks*, *Bush-Creepers*, *Titmice*, *Robins*, *Nightingales*, *Tailor-Birds*, &c.

THE BULBULS.

These birds belong chiefly to India, though a few are found in Africa; their sprightliness renders them general favorites; several species are greatly admired as songsters; they inhabit woods, jungles, and gardens, and feed on fruits and seeds, and occasionally on insects. One species, the *Pycnonotus jocosus*, is easily tamed and taught to sit on its master's hand. Great numbers may be seen in the bazaars of India. Another species, the *Pycnonctus hæmorrhous*, is kept for fighting. The under tail-coverts are red, and it is said the combatants endeavor to seize and pull out these feathers. The eggs are three to four in number, of a whitish color, with dark blotches.

THE ORIOLES.

These live in woods and shrubby places, usually in pairs, suspending their nests at the extremities of the branches of trees. The males are generally beautiful birds, a golden-yellow being the predominant color in their plumage. Their food consists of insects and fruits. They are, for the most part, inhabitants of tropical countries; but a single species, the GOLDEN ORIOLE, *Oriolus Galbula*, (see page 6,) migrates into Europe, in the southern parts of which it is abundant. It is of a bright yellow color, with the wings and tail black; the female is greenish-yellow above, and whitish beneath, with the wings and tail brown. It is about the size of our common robin. Its voice is loud, and has been compared to the sound of a flute; Bechstein says it resembles the word *puhlo*. The names given to the bird in different European languages are supposed to be, to a certain extent, imitations of its note. The Spaniards call it *Turiol*, the French *Loriot*, the English *Oriole;* and two of the German names are *Pirol* and *Bülow*.

The note of some of the Indian species is described as very similar to that attributed by Bechstein to the European bird. A nearly allied species, the MANGO-BIRD or GOLDEN ORIOLE of India, *Oriolus Kundoo*, is said to have a loud, mellow, plaintive cry, resembling *pee-ho*, and Mr. Pearson says of the BLACK-HEADED ORIOLE, *O. melanocephalus*, which is common in Bengal, that it has a monotonous, low note, resembling "one lengthened, full-toned note on the flute," which is so constantly repeated during the spring that it is a positive nuisance.

Most of the other species of the group resemble the golden oriole, both in character and habits; but one species, the REGENT-BIRD or KING HONEY-EATER, *Sericulus chrysocephalus*, of Australia, is remarkable for having the tip of the tongue terminated by a pencil of fine filaments like that of the honey-eaters, among which this bird has indeed been placed by some authors. The male is one of the most beautiful of Australian birds; its plumage, which is very glossy and satin-like, is variegated with two colors, deep black and brilliant yellow, the latter tinged with orange in some places. The female is dingy in its appearance. The Regent-Birds are found in the warmer parts of the Australian continent, where they inhabit the recesses of the forests, and appear to be exceedingly shy, feeding upon fruits and seeds. Our beautiful birds, the *Baltimore* and *Orchard Orioles*, belong to the *Icterinæ*, and will be noticed under that head.

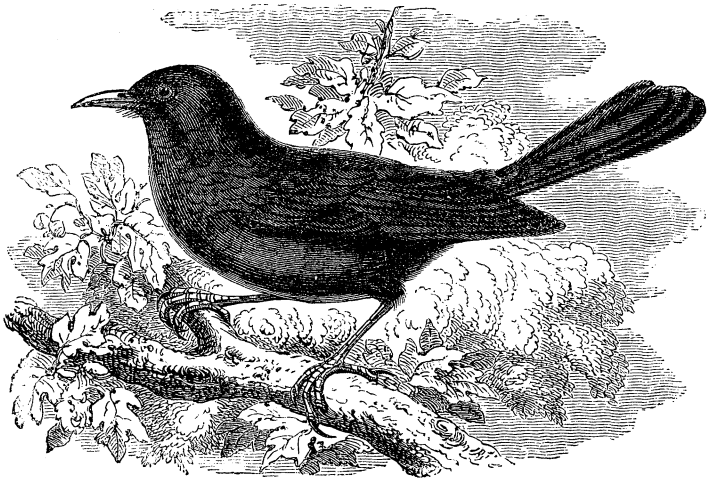
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THE BABBLERS.

This group, called *Timalinæ*, are small, noisy, gregarious birds, belonging to Asia and the Asiatic Islands and Australia; they live exclusively in the forests, feeding on insects; some of the species on fruit. Many of them have a sweet song, and some are excellent imitators of other birds. Some are noted for a singular cry, which resembles a loud human laugh, and this peculiarity has obtained for two or three of the species the names of the *Laughing Crow* and *Laughing Thrush* from the Europeans in India. The cry of the LAUGHING THRUSH, *Pterocyclus cachinnans*, is said by Dr. Jerdon to be a peculiar "sort of cracked Punch and Judy laugh," which is no sooner commenced by one than several others take up the chorus. The *Garrulax leucolophus*, or Laughing Crow, is also said to produce a sound closely resembling the human laugh. Some of these birds, as, for instance, the BLACK-FACED THRUSH, *Garrulax chinensis*, are tamed, and are amusing pets. The *Malacocircus Malcomi* of India is noted for its courage, and the SPOTTED GROUND-THRUSH of Australia, *Cinclosoma punctatum*—called *Ground-Hawk* at Hobart Town—is greatly esteemed for its flesh.

THE TURDINÆ OR TRUE THRUSHES.

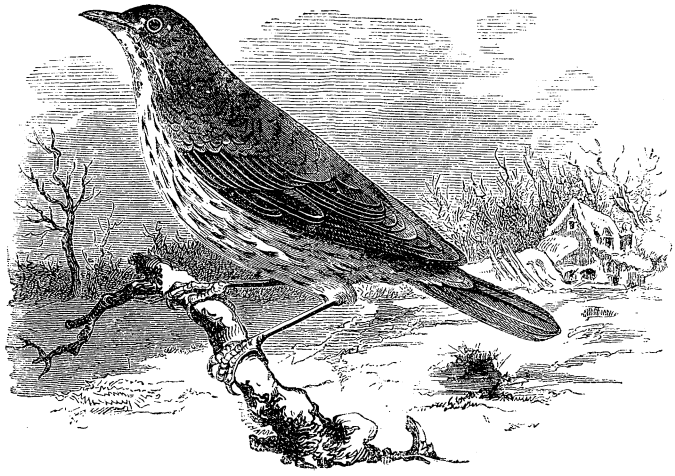
Of these the species are numerous in all parts of the globe; they generally frequent fields and pastures in search of food, but retire to the woods and thickets for security when roosting, and during the breeding season. Their nests are usually very neatly made, composed of grasses, twigs, and moss, frequently lined with a thin layer of mud, within which is another layer of soft vegetable substances for the reception of the eggs. The latter are usually five or six in number, variable in color, but commonly freckled with dark spots. The food of the thrushes consists both of animal and vegetable matters, such as insects and their larvæ, worms, snails, fruits and seeds.



THE BLACKBIRD.

Genus TURDUS: *Turdus.*—This includes numerous migratory species, visiting temperate countries either from the south in summer or from the north in winter, and popularly known for their song and their pleasing habits. Many of them, which are not found in America, are still rendered interesting and familiar to American readers from the constant allusions to them in English literature. One of the best known is the BLACKBIRD, *T. merula*—the *Merle Noir* of the French; *Mulo* of the Italians; and *Schwarz Drossel* of the Germans; it is about ten inches long, which is nearly the size of the Purple Grakle, which we call *Blackbird* in this country. Its color is black, the bill yellow; but albinos, entirely white, are sometimes known. It breeds early in the spring, usually forming its nest in a thick bush; the eggs are four or five in number. It frequents hedges, thickets, plantations, and gardens; is shy, restless, and vigilant, and if disturbed takes wing with a cry of alarm. It feeds on larvæ, snails, worms, insects, and fruits. The song is loud and

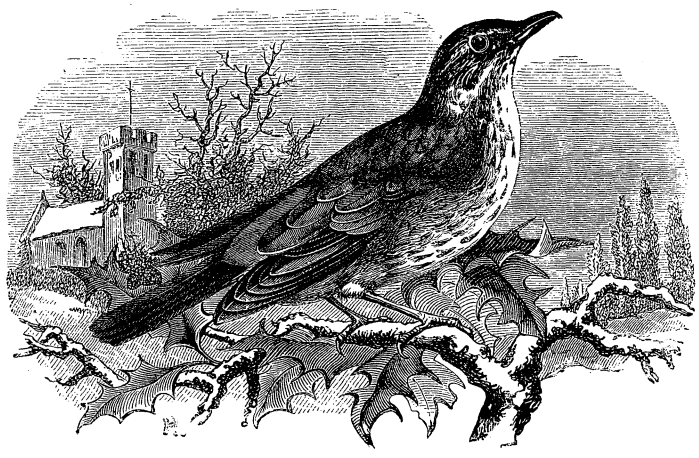
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THE SONG THRUSH.

vigorous, and oft repeated; it also imitates the notes of other birds, sometimes crowing like the cock, or taking up parts of the song of the nightingale. It is often kept in cages, but is most admired when at liberty in the open air.

The Song Thrush or Throstle, *T. musicus*—the *Mavis* of the Scotch, and often alluded to in Scottish verse; the *Grive* of the French; *Tordo* of the Italians; and *Sing Drossel* of the Germans—is found in every part of Europe, haunting the gardens and the woods and meadows, especially near streams, and everywhere admired for its charming song. It feeds on worms, insects, snails, and fruits. The nest is made of green moss externally, mixed with fine root-fibers; it is lined within with cow-dung and decayed wood, the lining forming a cement so perfectly spread that it will hold water; eggs are four or five, of a light blue, the larger end having a few small black specks or spots; the first hatch generally comes forth in April; there are generally two broods in the year; both the cock and the hen sit, but the former less than the latter; the male often feeding his mate on the nest. A holly, a thick bush, a dense and somewhat high shrub, or a fir, is usually selected; but the bird has been known to breed in an open shed. It is frequently kept in cages, and is taught to perform various simple airs.



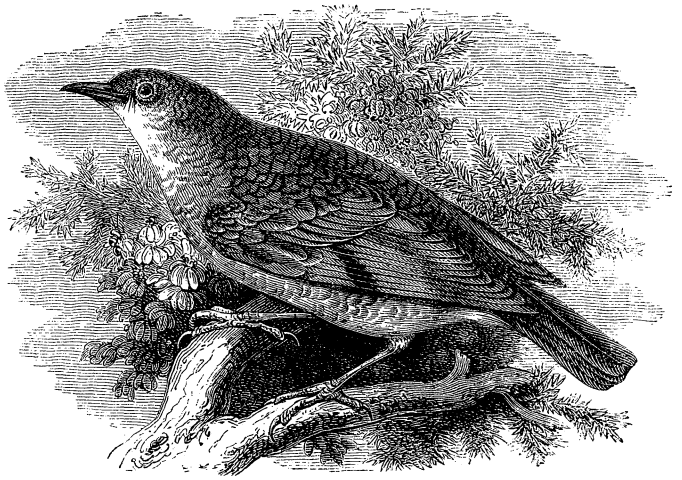
THE RED-WING THRUSH.

The Ring Ousel, *T. torquatus*, resembles the preceding, though it is a trifle larger; the color is black, with a crescent-shaped mark of pure white across the chest. It is a good singer, builds on or near the ground, lays four or five eggs, and sometimes flies in small flocks. It is a winter visitor from the north to the south of Europe.

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The Red-Wing Thrush, *T. iliacus*, migrates from the north to the south of Europe in winter, spending the latter season in England, France, and other parts where the climate is mild. Its favorite resorts are parks, and pleasure grounds ornamented with clumps of trees. They usually feed on worms, snails, and other soft-bodied animals, and therefore, when the ground happens to be covered with snow for a length of time, many of these birds perish. In summer this thrush migrates far north, to Norway, Lapland, and even the Faroe Isles and Iceland, where it breeds. Its song is pleasing, and it is sometimes called the *Norway Nightingale*. The upper parts of this bird are olive-brown: the under parts dull white, streaked with brown. From the preceding engraving, it will be seen that this bird, in its form and markings, bears a striking resemblance to our robin in its first autumn plumage.

The Missel Thrush, *T. viscivorus*—*Merle Draine* of the French—is also called in various parts of Great Britain *Gray Thrush*, *Holm-Thrush*, *Screech-Thrush*, *Stormcock*, and *Shrite*. The male and female exhibit little difference: the top of the head and almost all the upper surface of the body are nearly uniform clove-brown; wings and wing-coverts umber-brown; all the under surface of the body white, tinged with yellow, and covered with numerous black spots, the whole length about eleven inches. This is one of the largest of the species, and although not very common anywhere, it is very generally diffused; it is rather a shy bird, frequenting small woods and the high trees in hedges bounding large meadows. It remains in Middle and Southern Europe all the year. The name *Stormcock* is given to it from its habit of singing during storm and rain. It begins to build in April, and fixes its nest in the fork of a tree; the eggs are four or five in number, of a greenish-white color, spotted with red-brown. It feeds on worms, slugs, &c.; also fruits, especially those of the *mistletoe*, from which it derives its common English name.



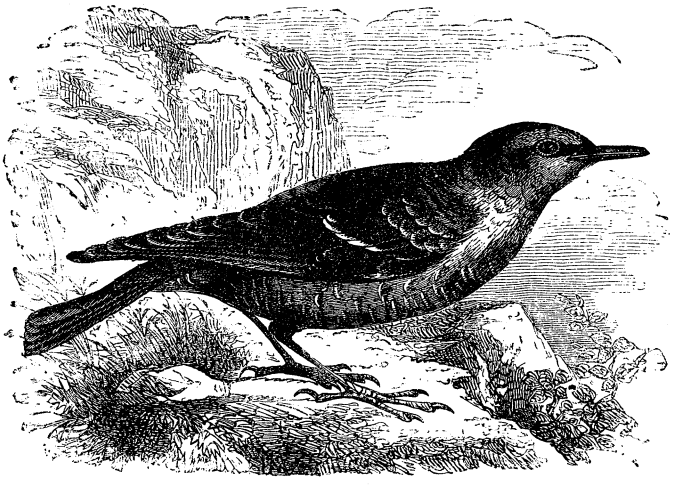
THE GOLDEN THRUSH OR WHITE'S THRUSH.

White's Thrush, *T. Whitei*—*T. varius* of Temminck—is a native of Japan and Java, but migrates into Southern Europe in summer, and has been taken a few times in the British Islands. It was first killed in Hampshire, and named after White, the celebrated naturalist of Selborne. Its color is brown-olive, with a golden reflection, above; below it is yellow, marked with crescent-shaped spots.

The Fieldfare or Gray Thrush, *T. pilaris*, has the head, hind neck, and wings, gray; fore part of the back chestnut; fore neck and breast reddish-yellow; lower wing-coverts and axillary feathers pure white; young of the year with duller tints, the feathers of the sides light, with a pale brown or dusky border within the white margin. This bird is migratory in the British Islands, coming from the north to spend the winter, and is one of the latest species that thus makes its appearance.

The Rock Thrush, *T. saxatilis*, has the neck and head bluish-gray; the back black, spotted

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THE ROCK-THRUSH.

in the middle with white; the under parts reddish; its food consists chiefly of insects in summer; in winter it devours figs and other fruits. It lives in Southern Europe, ascending to the tops of the high mountains in summer, and coming down to the lower slopes in winter. It frequents old edifices, and sometimes enters the towns, and loves to perch on the naked branches of decayed trees. It builds its nests in the crevices of rocks, or in old towers, laying four to five eggs.

The BLUE THRUSH, *T. cyaneus*, is eight and a half inches long, and its color is of a deep blue; it inhabits Europe along the borders of the Mediterranean. The AFRICAN ROCK-THRUSH, *T. rupestris*, is an African species, resembling the rock-thrush. The SPY-THRUSH, *T. explorator*, is eight inches long, of a brown color above, and maroon beneath; it lives upon mountains, and inhabits Africa. Other African species are the *T. reclamator* and *T. importunus*, *T. aurigaster* and *T. strepitans*. There are still other species, especially in India, among which we may name the *T. erythrogaster;* several of the species of this part of the world inhabit the mountains, at an elevation of five or six thousand feet above the level of the sea.

The most celebrated American thrush—indeed, the most celebrated of all thrushes—is the AMERICAN MOCKING-BIRD, *T. polyglottus*—the *Mimus polyglottus* of Boie and Baird. It is about nine or ten inches long; brownish-ash above, and beneath a brownish-white. It is considerably larger than its rival the nightingale, but its colors are equally modest. It is migratory, and usually begins to build its nest in the Southern States, where it is very abundant, early in April; in the Middle States, beyond which it seldom ventures, in May and even June. Its nest consists of sticks, intermixed with straw, hay, and wool, lined with fine roots; the eggs are four to five. Wilson has drawn the portrait of this bird with great spirit and felicity. He says:

"The plumage of the mocking-bird, though none of the homeliest, has nothing gaudy or brilliant in it, and, had he nothing else to recommend him, would scarcely entitle him to notice; but his figure is well proportioned, and even handsome. The ease, elegance, and rapidity of his movements, the animation of his eye, and the intelligence he displays in listening and laying up lessons from almost every species of the feathered creation within his hearing, are really surprising, and mark the peculiarity of his genius. To these qualities we may add that of a voice full, strong, and musical, and capable of almost every modulation, from the clear, mellow tones of the wood-thrush, to the savage scream of the bald eagle. In measure and accent he faithfully follows his originals. In force and sweetness of expression he greatly improves upon them. In his native groves, mounted on the top of a tall bush, or half-grown tree, in the dawn of dewy morning, while the woods are already vocal with a multitude of warblers, his admirable song rises pre-eminent over every competitor. The ear can listen to *his* music alone, to which that of all the others seems a mere accompaniment. Neither is this strain altogether imitative. His own native notes, which are easily distinguishable by such as are well acquainted with those of our various song

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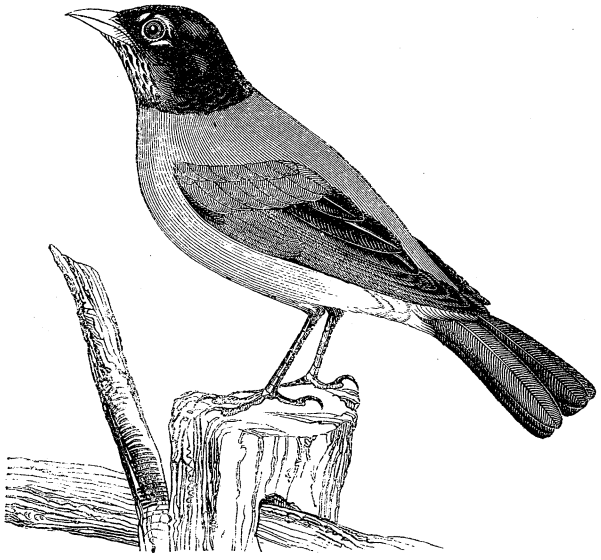


MOCKING-BIRDS DEFENDING A NEST FROM A RATTLESNAKE.

birds, are bold and full, and varied seemingly beyond all limits. They consist of short expressions of two, three, or, at the most, five or six syllables; generally interspersed with imitations, and all of them uttered with great emphasis and rapidity, and continued, with undiminished ardor, for half an hour or an hour at a time. His expanded wings and tail, glistening with white, and the buoyant gayety of his action, arresting the eye, as his song most irresistibly does the ear, he sweeps round with enthusiastic ecstasy—he mounts and descends as his song swells or dies away; and, as my friend Mr. Bartram has beautifully expressed it, 'he bounds aloft with the celerity of an arrow, as if to recover or recall his very soul, expired in the last elevated strain.' While thus exerting himself, a bystander, destitute of sight, would suppose that the whole feathered tribes had assembled together on a trial of skill, each striving to produce his utmost effect, so perfect are his imitations. He many times deceives the sportsman, and sends him in search of birds that perhaps are not within miles of him, but whose notes he exactly imitates; even birds themselves are frequently imposed on by this admirable mimic, and are decoyed by the fancied calls of their mates, or dive with precipitation into the depth of thickets, at the scream of what they suppose to be the sparrow-hawk.

"The mocking-bird loses little of the power and energy of his song by confinement. In his domesticated state, when he commences his career of song, it is impossible to stand by uninter-

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THE AMERICAN ROBIN, OR MIGRATORY THRUSH.

ested. He whistles for the dog—Cæsar starts up, wags his tail, and runs to meet his master. He squeaks out like a hurt chicken—and the hen hurries about with hanging wings, and bristled feathers, clucking to protect its injured brood. The barking of the dog, the mewing of the cat, the creaking of a passing wheelbarrow, follow, with great truth and rapidity. He repeats the tune taught him by his master, though of considerable length, fully and faithfully. He runs over the quiverings of the canary, and the clear whistlings of the Virginia nightingale, or redbird, with such superior execution and effect, that the mortified songsters feel their own inferiority, and become altogether silent; while he seems to triumph in their defeat by redoubling his exertions.

"This excessive fondness for variety, however, in the opinion of some, injures his song. His elevated imitations of the brown thrush are frequently interrupted by the crowing of cocks; and the warblings of the bluebird, which he exquisitely manages, are mingled with the screaming of swallows, or the cackling of hens; amid the simple melody of the robin, we are suddenly surprised by the shrill reiterations of the whippoorwill; while the notes of the killdeer, blue jay, martin, Baltimore, and twenty others, succeed, with such imposing reality, that we look round for the originals, and discover, with astonishment, that the sole performer in this singular concert is the admirable bird now before us. During this exhibition of his powers, he spreads his wings, expands his tail, and throws himself around the cage in all the ecstasy of enthusiasm, seeming not only to sing, but to dance, keeping time to the measure of his own music. Both in his native and domesticated state, during the solemn stillness of night, as soon as the moon rises in silent majesty, he begins his delightful solo, and serenades us the livelong night with a full display of his vocal powers, making the whole neighborhood ring with his inimitable medley."

The American Robin is familiarly known from Texas to Labrador, and throughout this vast region is a universal favorite. It is a totally different bird from the *Robin Redbreast* of England, being nine inches long, and therefore nearly twice the size of that celebrated little pet. It is in fact a thrush, and is about the size of several English thrushes, and has their manners; it is called the Migratory Thrush by naturalists, *T. migratorius*, on account of its wandering habits. The bill is strong, and of a yellow color; the head, back of the neck, and tail, black; the back and rump ash-color; the wings black, edged with light ash; the breast of the male a deep orange-red. The colors of the female are somewhat fainter. It arrives from the south early in the spring, and usually builds its nests in the orchards; its eggs are five, and of a beautiful sea-green color. It feeds on worms, caterpillars, cherries, wild cherries, currants, and, various other berries. It frequently produces two broods in a season. It has a pleasant, lively song, and during the period of rearing its young, the most confiding manners; and hence it is not only tolerated, but protected and cherished by general consent. After the family cares are over,

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it remains in flocks around the woods and dells till November, when it migrates southward, yet moving only so far as may be necessary for obtaining food. Many of them remain during mild winters in the forests of New Jersey, though in general the greater part proceed as far as the Southern States. In autumn, throughout New England and the Middle States, being fat and greatly relished, thousands of them are killed for the table.

The BROWN or FERRUGINOUS THRUSH, *T. rufus*—the *Thrasher* of New England, and *French Mocking-Bird* of the Middle and Southern States—is the largest of our thrushes, being eleven and a half inches long. It has a varied and beautiful song, not of imitated but original notes, usually poured out at evening from the top of some tree near its nest. Its haunts are in low, thick bushes, where it seeks concealment, though often seen glancing from one bush to another. Its food consists of worms, caterpillars, and berries, and it rears two broods in a season. Its colors are bright reddish-brown above; lower parts yellowish-white, beautifully marked with spots running in chains. It is easily tamed, and is not only a fine songster, but displays great intelligence. During the warm season it extends from Florida to Canada.

The WOOD-THRUSH, *T. melodius*, inhabits the whole of North America, from Texas to Hudson's Bay, arriving in the Middle States in May, and retiring in October. It is eight inches long; above fulvous-brown, below white, tinged with buff. It is shy, living in pairs in low, thick-shaded glens and hollows. Its nest is of withered leaves and stalks of grass, mixed with mud, and nicely plastered, the interior being lined with fine fibrous roots of plants; the eggs are four to five. This is one of our most pleasing songsters.

The GOLDEN-CROWNED THRUSH or OVEN-BIRD, *T. aurocapillus*, is a summer visitant throughout most of the United States; it is six inches long, of a yellow-olive above and white beneath. It is shy and retiring, and sits and runs along the ground like a lark. Its nest is sunk in the ground on some dry, bushy bank, being oven-shaped, and made of dry blades of grass; it is covered exteriorly with leaves and twigs, to match the surface around, for the purpose of concealment. It rears two broods in a season, and not unfrequently becomes the foster-parent of young cow-troopials, whose mothers surreptitiously deposit their eggs in the nest. Its food consists of insects.

The AQUATIC THRUSH, or NEW YORK WARBLER, *T. aquaticus*, haunts the borders of streams, and often wades in shallow rivulets in search of aquatic insects, moving its tail as it follows its prey, and chattering as it flies. It is six inches long, dark olive above, and extends its migrations throughout the United States.

The CAT-BIRD, *T. felivox* or *T. lividus*, is one of our most familiar birds, coming from the south in spring, and breeding in bushes and thickets, from which it frequently utters its cry, resembling the vigorous mewing of a cat, at the same time assuming an appearance of the greatest agitation and anxiety. It is nine inches long, of a dark slate-color, and paler beneath. Its food consists of insects, beetles, and various garden fruits, especially cherries. It is a fine songster, its notes resembling those of the ferruginous thrush, though they are often made up in part of blended imitations of other birds. This song, often heard late in the evening as well as early in the morning, is very pleasing. Yet the cat-bird is a common object of persecution, especially to boys in the country, who seldom let an opportunity slip to hurl a stone at it. This arises, no doubt, from a sort of impertinent familiarity which this bird assumes, and from its caterwaul, which, as it is uttered from its bushy retreat, often appears like a meditated personal insult to the passer by. The cat-bird is also a notorious cherry thief, and, taking the best, naturally provokes hostility.

The CURVED-BILLED THRUSH—*Toxostoma rediviva* of Gambel—is eleven and a half inches long, light brown above, breast and sides light brown, tinged with rufous; an exquisite and powerful songster, equal to the brown thrush; found in California and New Mexico.

The TAWNY THRUSH, *T. Wilsonii*, is ten inches long, and of a tawny-brown above and white below; it comes from the south in May, and has no song but a sharp chuck.

The HERMIT-THRUSH, *T. solitarius*, is seven inches long; deep olive above, and dull white below; is stationary in the Southern States.

The VARIED THRUSH, *T. nævius*, is ten inches long; above leaden-gray, below reddish-orange; found in California and the fur countries.

The DWARF THRUSH, *T. nanus*, is six inches long; olive-brown above, beneath grayish-white; found on the Columbia River.

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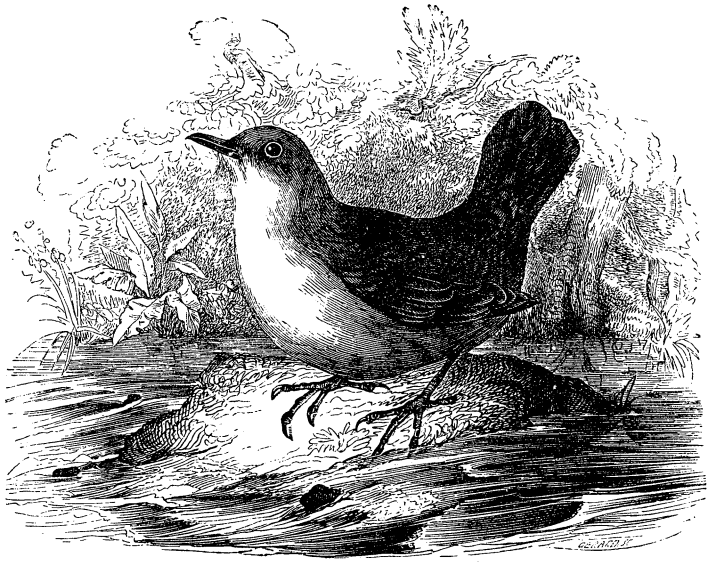
THE FORMICARINÆ OR ANT-THRUSHES.



THE GIANT PITTA.

These, to the East Indian species of which Buffon gave the name of *Breves*, resemble the true thrushes, but inhabit tropical portions of both hemispheres, where they live chiefly on insects, and devour large quantities of ants, whence their name. Their wings are generally short, and some of the species, as the *Pitta Nipalensis*, for instance, have such limited powers of flight that a man can easily overtake them. Those of the genus *Pitta*, which are peculiar to the eastern hemisphere, are adorned with exceedingly brilliant plumage, azure-blue being the prevalent tint. Of this is the GIANT PITTA, *P. gigas*, of the size of a magpie, and of a brilliant green color: found in Sumatra. The numerous South American species are of more sober colors, mostly brown and white. They obtain their living chiefly from the enormous ant-hills of the regions in which they live. Griffith says of these birds, "they are essentially gigantic wrens."

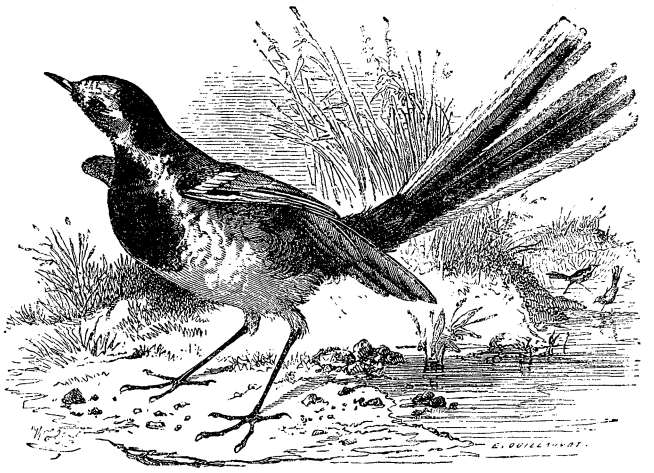
Of the genus CINCLUS there is a single European species, the well-known WATER-OUSEL or DIPPER, *C. aquaticus*. This is eight inches long, dark gray above, the neck white, the belly brownish-red. Its wings are longer than those of most others of the group, and it flies steadily and rapidly. Its haunts are along the borders of clear streams and lakes; it swims with ease, and dives freely into the water, and walks about on the bottom with facility, even making its way against a strong current. Its food consists of small shell-fish and insects. The nest is oven-shaped, and made on the banks of streams: the eggs pure white, five or six in number.



THE BLACK DIPPER, OR EUROPEAN WATER-OUSEL.

There are one or two other species known in Europe and Asia, and one in America, the BLACK DIPPER, *C. Pallasii:* this resembles the common European dipper, but is of a darker color, and is without the white mark on the throat. It is found in Mexico and parts of Upper Canada.

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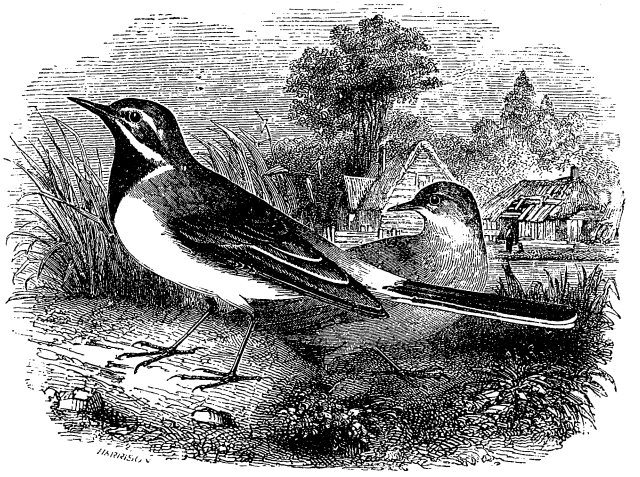
THE PIED WAGTAIL—FEMALE.

THE SYLVIDÆ OR WARBLERS.

This is a very extensive family, including the *Wagtails*, *Titlarks*, *Bush-Creepers*, *Titmice*, *Robins*, *Nightingales*, and *True Warblers*—noted for their sprightliness, and many of them for their fine musical powers.

THE MOTACILLINÆ OR WAGTAILS.

This group includes a large number of species of small birds, belonging to Europe, Asia, and Africa, generally of sober colors, but beautiful in form. Some are fine songsters; all are distinguished for vivacity and sprightliness of air and manner. The bill is moderately long, straight, and slender; the wings long and pointed; the tail nearly twice the length of the body, and remarkable for a constant jerking motion, which has given these birds their common name. They live in meadows and pastures, run swiftly, and have an exceedingly graceful, buoyant, and undulating



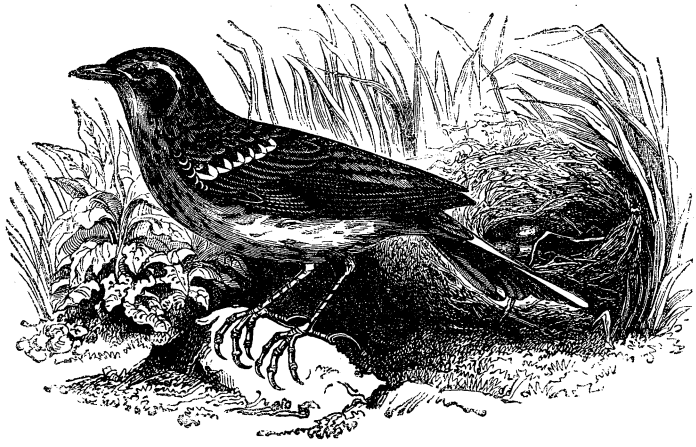
THE GRAY WAGTAIL.

flight. On alighting upon the ground, they spread the tail, and while running along, constantly vibrate the body and tail in a very singular manner. Their food consists of insects and worms; their nests are made upon the ground, amid herbage and stones, and they lay from four to six spotted eggs. Their note is short and shrill, and is often repeated as they run about in search of their prey. They frequent streams and pools, and may often be seen wading in shallow brooks. This habit of dabbling in the water has given them the name of *Lavandières*, or *Washer-women*, in France.

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These birds are common in Europe, several species being known in Great Britain. The genus MOTACILLA includes the PIED WAGTAIL, *M. Yarrellii*, which is seven inches long; upper parts, sides, and flanks, black, variously marked with white; breast, belly, and under tail-coverts, white. It is a very sprightly bird, ever in motion, running about or moving from place to place by short, undulating flights, uttering a cheerful note, and alighting again on the ground with a sylph-like buoyancy, and a graceful, fanning motion of the tail. This species remains in Southern Europe throughout the year.

Other species are the WHITE WAGTAIL, *M. alba*, a summer visitor to Britain; the GRAY WAGTAIL, *M. boarula*, chiefly confined to Southern Europe; the GRAY-HEADED WAGTAIL—called *Bergeronnette* in France—*M. flava*, common in Central and Northern Europe, but rare in Great Britain; the YELLOW WAGTAIL or RAY'S WAGTAIL, *M. Rayi*, avoiding wet lands, and seeking arable fields; a rare species throughout the continent; the WHITE-WINGED WAGTAIL, *M. lugubris*, is found in Eastern Europe; the KING-KING, *M. speciosa*, is but four and a half inches long, and belongs to Java. There are still other species in Asia and Africa, and it may be remarked that those we have noticed as found in Europe are also, for the most part, found in these other divisions of the eastern continent.



THE MEADOW PIPIT.

THE PIPITS OR TITLARKS.

These birds resemble the wagtails, and also make a close approach to the larks. They feed on seeds and insects. Of the genus ANTHUS there are several species. The MEADOW PIPIT or TITLARK, *A. pratensis—Farlouse des prés* of the French—is six inches long; grayish-red above, and yellowish-red below. It frequents stony and arid slopes, lives on insects, worms and slugs, makes its nest in the sand against a rock or stone, and lays four to six eggs. The female has the habit of many other birds, that of pretending to be wounded, so as to draw off attention from her eggs or her young, when a stranger approaches them. It is a summer visiter throughout the temperate parts of Europe.

Other species are the TREE-PIPIT, *A. arboreus*, found as a summer visitor in wooded and cultivated districts from Italy to Denmark; the ROCK-PIPIT, *A. petrosus*—the *Field-Lark*, *A. campestris* of Bewick, *Pipi-Rousselin* of the French—inhabiting flat shores along the sea; is found in the maritime parts of Southern Europe: RICHARD'S PIPIT, *A. Ricardi*, frequents old pastures; found in Europe along the Mediterranean, and rarely in France and England; and *A. Spinoletta—A. aquaticus* of Bechstein—common throughout Europe. These are all migratory.

The AMERICAN PIPIT or TITLARK, *A. Ludovicianus*—the *Brown* or *Red Lark* of Nuttall—is six and a half inches long; upper parts grayish-brown; beneath dusky white; breast spotted with black; eggs four to five; builds in mountainous districts; winters in Louisiana, and migrates northward as far as latitude 63° in summer. It breeds in Labrador and the fur countries.

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THE MNIOTILTINÆ OR BUSH-CREEPERS.

These are small birds, found in both hemispheres, residing in woods and thickets, and feeding on insects, worms, and spiders. In pursuit of their prey they creep about upon the bushes with great facility, examining every leaf, and poking their heads into flowers to capture the minute insects that seek shelter among the petals. They are very sociable, and assemble in flocks, frequently mingling with other birds. Their nests are very curious, sometimes arched over, and sometimes suspended by fibers of bark to the thin twigs of trees. One of the most common species is the *Zosterops palpebrosus*, common in India. This is often seen with its forehead powdered with pollen, acquired during its inspection of the flowers.



THE LONG-TAILED TITMOUSE.

THE PARINÆ OR TITMICE.

These lively and courageous little birds, called *Mésange* by the French, are common to both continents. In England they are popularly called *Tits*, *Tomtits*, and *Titmice;* in America, *Chickadees*, from the call or cry of one of the most common species. About fourteen European species are known, twelve in North America, and several in India, the Himalaya Mountains, Japan, New Zealand, and Australia. They are found principally in wooded districts, where they feed upon insects and larvæ, which they capture both upon the bark and leaves of the trees and shrubs. In search of these they may be seen clinging in every variety of attitude to the branches and twigs; and when thus engaged, from the sprightliness of their whole behavior, they are exceedingly pleasing objects. They are seen engaged in this manner in gardens, where they climb about the fruit-trees in every direction, and often destroy a good many buds in their search for insects contained in them. They build their nests in various situations—in cavities in walls, in hollow trees, and on the branches of trees.

The *Genus* PARUS: *Parus*, contains several species: the GREAT TITMOUSE, *P. major*, is somewhat less than six inches long; the upper parts are greenish-ash; the breast, sides, and flanks, dull sulphur-yellow. It inhabits woods, the vicinity of gardens, and sheltered situations, in summer, feeding often on seeds. In winter it approaches the habitations of man, and closely examines the thatch of old buildings in search of the small flies that harbor there. In September the

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THE GREAT TIT.



THE BLUE TIT.

amatory notes of the male may be heard, sometimes resembling the noise made in sharpening a saw. The nest, formed of moss, and lined with hair and feathers, is usually placed in the hollow of a tree, or the hole in a wall. The eggs are from six to nine in number. This species is a constant resident throughout the different parts of Europe.

The Blue Tit, *P. cæruleus*, is an exceedingly common species, distributed like the preceding throughout Europe. Its length is four and a half inches. Its body is variously marked with blue, black, and white. It usually builds in a hole in a wall or a tree, the nest being made up of a profusion of moss, hay, and feathers. The eggs vary from six to twelve. If its nest is invaded by a school-boy, the bird hisses like a snake or an angry kitten. If the ravager perseveres he is sure to have his hand severely bitten. Hence one of the popular names of this bird in England is *Billy-biter*. It is reproached by the gardeners for destroying the buds of plants, and hence many of them are killed.

The Crested Tit, *P. cristatus*, is four and a half inches long, its colors black and brown above, and whitish-fawn below. It is a northern species, being common in Denmark, Sweden, Russia, and also in the mountainous and wood-covered portions of Germany and Switzerland.

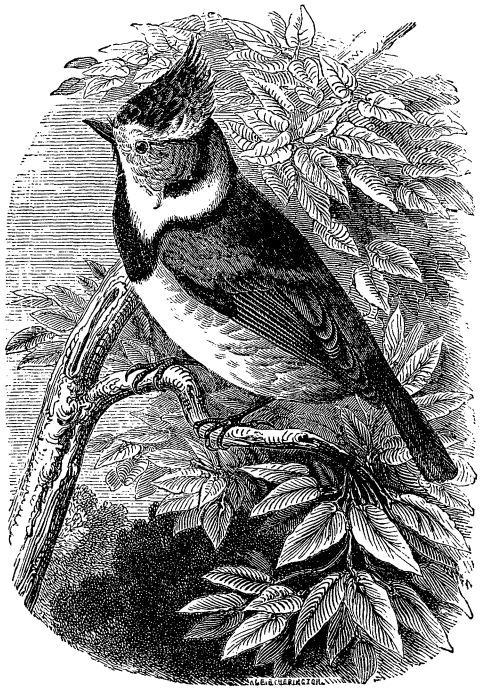
The Bearded Tit, *P. biarmicus*, is a little over six inches long, and is one of the larger species; it is fawn-color above, and grayish-white, tinged with yellow, below. It has beneath the base of the beak, on each side, a beard or whisker—three feathers of one inch long. It is common in Middle Europe.

The Coal-Tit, *P. ater*, is four and a half inches long, and is variously colored with black, white, brown, green, and gray. It is an exceedingly pretty bird, roving from tree to tree in search of insects and seeds, sometimes associating in flocks with other small birds. They are widely distributed throughout Europe, and are residents all the year in the temperate portions of it.

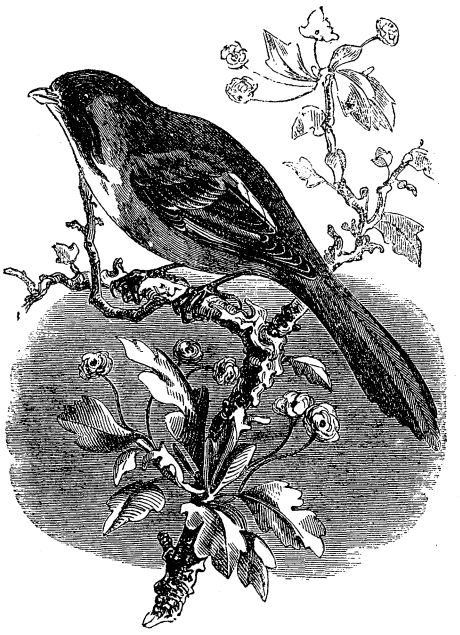
The Marsh Tit, *P. palustris*, is of the size of the preceding. It is ashy-brown, tinged with green, above; the under parts grayish-white. It is common in certain localities throughout Europe, and like most of the species we have described, is plentiful in the vicinity of London.

The Long-tailed Tit, *P. caudatus*, is the most noted of the species. It is about five and a half inches long, half that length consisting of its tail. It is black above, the under surface grayish-white. The various names which this species has acquired in England is good evidence of its notoriety: *Bottle-Tit*, *Bottle-Tom*, *Long-tailed Farmer*, *Long-Tail Mag*, *Long-Tail Pie*, *Poke-*

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THE CRESTED TIT.



THE BEARDED TIT.

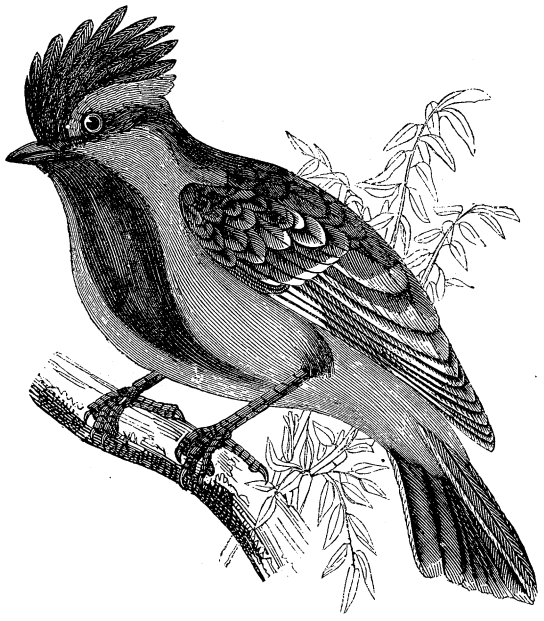
Pudding, *Huckmuck*, and *Mum-Ruffin*, of the English, are among its popular designations there. The Italians call it *Pendolino;* the French *Mésange à la Longue Queue* and *Perd sa Queue;* the Germans *Langschwänzige Meise;* and the Welsh *Y Benloyn Gnyffonhir*. This species is found throughout Europe and Northern Asia, and remains through the winter in England. Pennant, speaking of their flight, says that from the slimness of their bodies and great length of tail, they appear like so many darts cutting the air. Yarrell describes the habits of this interesting little bird as follows: "The nest of this species is another example of ingenious construction, combining beauty of appearance with security and warmth. In shape it is nearly oval, with one small hole in the upper part of the side by which the bird enters. I have never seen more than one hole. The outside of this nest sparkles with silver-colored lichens, adhering to a firm texture of moss and wool, the inside profusely lined with soft feathers. The nest is generally placed in the middle of a thick bush, and so firmly fixed that it is mostly found necessary to cut out the portion of the bush containing it, if desirous of preserving the natural appearance and form of the nest. In this species the female is known to be the nest-maker, and to have been occupied for a fortnight to three weeks in completing her habitation. In this she deposits from ten to twelve eggs, but a larger number are occasionally found; they are small and white, with a few pale red specks, frequently quite plain, measuring seven lines in length and five lines in breadth. The young family of the year keep company with the parent birds during their first autumn and winter, and generally crowd close together on the same branch at roosting-time, looking, when thus huddled up, like a shapeless lump of feathers only. These birds have several notes, on the sound of which they assemble and keep together: one of these call-notes is soft and scarcely audible; a second is a louder chirp or twitter; and a third is of a hoarser kind."

The Penduline Titmouse, *P. pendulinus*, is four and a half inches long; reddish-gray above; lower parts whitish, with rosy tints; lives along the sandy borders of rivers, and builds a flask-shaped nest at the extremity of some willow twig or other flexible branch of a tree; found in Southeastern Europe.

The Cape Titmouse, *P. Capensis*, found at the Cape of Good Hope, has the head, throat and belly black; the rest of the body cinereous: it is noted, like the preceding, for its elaborate nest.

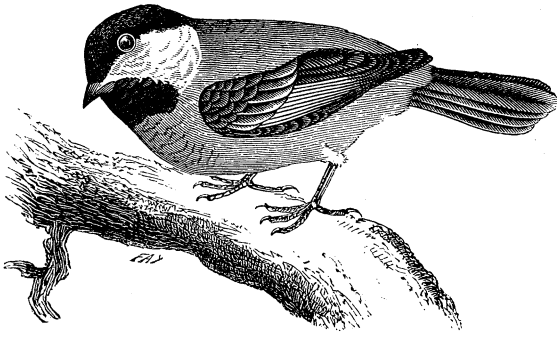
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The *P. xanthogenys* is a native of the Himalaya Mountains, five and a half inches long, has a full crest of black feathers, back olive, cheeks yellow, sides of the chest and flanks yellow; a broad black line passing down the throat; is somewhat smaller than the great tit.



THE P. XANTHOGENYS.

Among the American species we may first notice the BLACK-CAPPED TITMOUSE, *P. atricapillus*, familiarly known by the name of *Chickadee*, from its common cry, and sometimes called *Snow-Bird*, from its appearing about the houses in flocks upon the first flights of snow. It is five and a half inches long; the top of the head and neck black; the rest of the upper parts lead-colored; beneath yellowish-white. It is a permanent resident among us; active, noisy, and restless; hardy beyond any of his size, braving the severest cold of our continent as far north as the country round Hudson's Bay, and always appearing most lively in the coldest weather. The males have a variety of very sprightly notes, which cannot, indeed, be called a song, but rather a lively, frequently repeated, and often varied twitter. They are most usually seen during the fall and winter, when they leave the depths of the woods and approach nearer to the scenes of cultivation. At such seasons they abound among evergreens, feeding on the seeds of the pine-tree; they are also fond of sunflower seeds, and associate in parties of six, eight, or more, attended by the nut-hatch, the crested titmouse, brown creeper, and small spotted woodpecker, the whole forming a very nimble and restless company, whose food, manners, and dispositions are pretty much alike. About the middle of April they begin to build, choosing the deserted hole of a squirrel or woodpecker, and sometimes, with incredible labor, digging out one for themselves. The female lays six white eggs, marked with minute specks of red; the first brood appear about the beginning of June, and the second toward the end of July; the whole of the family continue to associate together during winter. They traverse the woods in regular progression, from tree to tree, tumbling, chattering, and hanging from the extremities of the branches, examining about the roots of the leaves, buds, and crevices of the bark, for insects and their larvæ. They also frequently visit the orchards, particularly in fall, in the same pursuit, trees in such situations being generally much infested with insects. This species is very widely distributed throughout North America.



THE COMMON CHICKADEE.

The CAROLINA TIT or CAROLINA CHICKADEE, *P. Carolinensis*, a little over four inches long, black above and grayish beneath, and frequenting marshy situations, is found in the Southern States; the LONG-TAILED CHICKADEE, *P. septentrionalis*, six inches long, body ashy-brown above, below ashy-white, is found in Missouri and the Rocky Mountains; the MOUNTAIN-TIT, *P. montanus*, five inches long, body above cinereous, below ashy-brown, is found in California; the HUDSON BAY TIT, *P. Hudsonicus*, five inches long, above ashy-brown, below ashy-white, found by

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Dr. Brewer breeding in Maine; and *P. rufuscus*, four and half inches long, body and sides chestnut color, beneath ashy-white, found in Oregon and California.

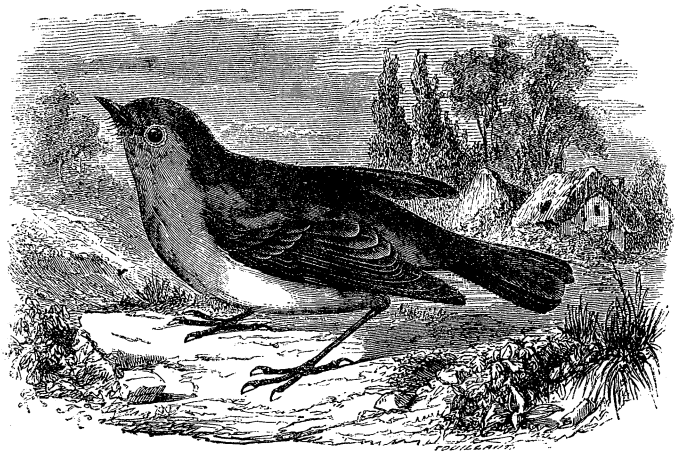
The following American species are arranged by Cassin under the genus *Lophophanes*, designed to include those which are characterized by a crest: the PETO or TUFTED TITMOUSE of Nuttall, *P. bicolor*—called *Crested Titmouse* by De Kay and Audubon—six and a half inches long; dark bluish-ash above, and soiled-white beneath. According to Nuttall it has a great variety of note, among which *peto, peto, peto; kai-tee-did, did, dit, did*, and *whip-tom-kelly*, are occasionally heard. This author, as well as Mr. Gosse, expresses surprise that the name of *Whip-tom-kelly* should have been given to the red-eyed vireo, as it seems to him impossible that such sounds could, by the liveliest invention, be made out of its song. This species is spoken of by De Kay as occurring throughout the northern regions of Europe and America. It is, however, distinct from the common Crested Titmouse, *P. cristatus*, which we have described.

The BLACK-CRESTED CHICKADEE, *P. atricristatus*, is six inches long; above cinereous; beneath ashy-white; flanks reddish-brown; inhabits Texas and Mexico.

The PLAIN-CRESTED CHICKADEE, *P. inornatus*, is five and a half inches long; cinereous above, inclined to olive; below ashy-white; found in California.

The TEXAN CHICKADEE, *P. annexus*, is five inches long; cinereous above, tinged with olive; below ashy-white; found in Texas.

By the same author the following are arranged under the genus *Psaltria:* TOWNSEND'S CHICKADEE, *P. minimus*, four inches long; found in Oregon and California; and the BLACK-EARED CHICKADEE, *P. melanotis*, four inches long; found in Texas and Mexico.



THE EUROPEAN ROBIN REDBREAST.

ERYTHACINÆ OR ROBINS.

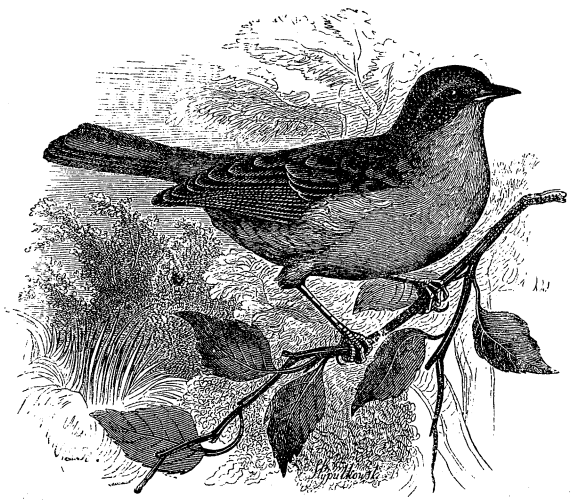
This name includes several genera and many species, distributed over the eastern hemisphere. They feed principally upon insects and worms, and to some extent on fruits.

Genus ERYTHACUS: *Erythacus.*—This includes the ROBIN, *E. rubecula*, so familiarly known in England, and so often alluded to in English literature. It passes there under the various names of *Robin Redbreast, Robin Redstart, Robinet*, and *Ruddock;* in France it is called *Rouge Gorge, Marie-Godrie*, and *Maroyette.* It is a constant resident throughout the temperate parts of Europe; is five and a half inches long; above olive-brown; upper part of the breast reddish-orange; lower part of the breast and belly white. It is little more than half the size of the migratory thrush, which we call *Robin*, and sometimes *Robin Redbreast.* The song of the European robin is sweet and plaintive; it rises early and goes to bed late; breeds early in spring; makes its nest of moss, leaves, and grass, lined with hair and feathers; lays five to seven yellowish-brown eggs; and loves to dwell and nestle near to man—in the hedges around the house, and the trees of the garden. It is easily tamed, and its air of sprightliness and confidence renders it a great favorite.

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In severe weather it approaches the house, and picks up the crumbs around the door; if tolerated, it hops into the house, with a cunning expression of doubt and familiarity in its full, expressive eye, and soon makes itself at home. It is probably the most universal feathered favorite in the countries it inhabits.

Genus ACCENTOR: *Accentor*.—This includes the HEDGE-ACCENTOR, HEDGE-WARBLER, or HEDGE-SPARROW, *A. modularis*—called *Traine-buisson* in France—an abundant European species, which, like the robin, lives in the vicinity of man, making its special haunts in hedgerows and gardens. Its song is short but sweet; the length five and a half inches; the upper parts brown, beneath steely-gray; it lays six eggs, occupies the forests in summer, and seeks cultivated districts and human habitations in winter.

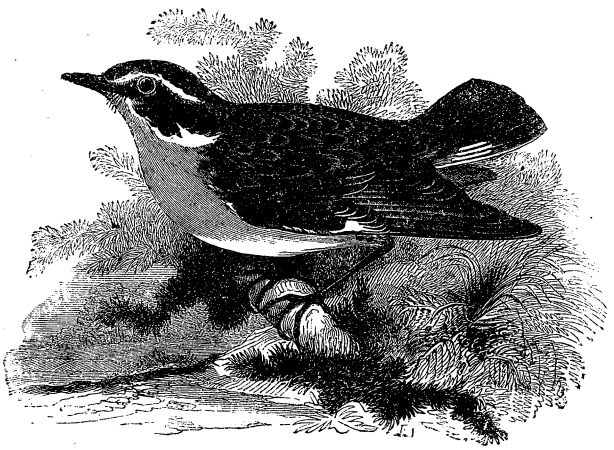


THE HEDGE ACCENTOR.

The ALPINE ACCENTOR, *A. Alpinus*, is a larger species, living in the high Alps.

Genus SAXICOLA: *Saxicola*, includes several species, all of which are migratory. The STONECHAT, *S. rubicola*—the *Traquet Patre* of the French—is somewhat smaller than the robin, and frequents heaths covered with furze and brushwood. In pursuit of its insect food, it frequently is seen creeping from one stone to another, while it utters a chattering sound; hence its popular English names of *Stonechat* and *Stoneclink*. It builds rather a large nest, and lays five or six eggs. It is common in summer throughout Southern and Middle Europe, and is also found in Northern Asia.

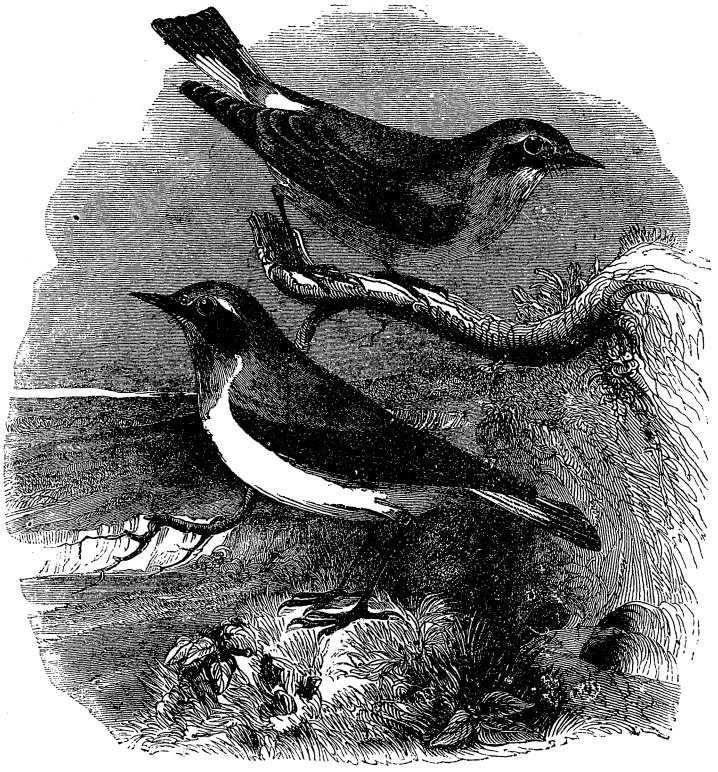
The WHINCHAT, *S. rubetra*—the *Traquet Tarier* of the French—is five inches long, with a mixture of pale and dark brown above; under parts fawn-color. In general, this bird is migratory, but a few remain in England throughout the year. Its flight is undulating, and it flits from bush to bush, perching on one of the topmost twigs. Furze commons are its favorite haunts; hence it is often called *Furzechat*, and as the furze is called *whin*, it thus also obtains its common title. Worms, insects, small shell-molluscs, and slugs, form its principal food, but it also eats berries. The nest is formed of dry grass-stalks and a little moss, the lining being finer bents or stalks; it is usually placed on the ground. The song is very pleasing, and resembles that of the goldfinch; and the bird will sing not only during the day, but in the evening, and sometimes at night. This species become, like the wheat-ear, very fat in August, and, though smaller, are equally delicate for the table.



THE WHINCHAT.

The WHEAT-EAR or FALLOWCHAT, *S. œnanthe*—the *Traquet Motteux* of the French—is a migratory species, arriving in Europe toward the middle of May, and leaving toward the close of

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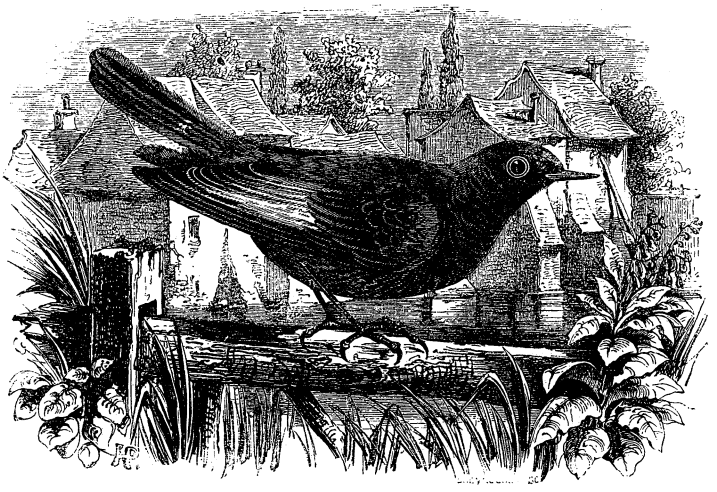
THE WHEAT-EAR.

September. It is six and a half inches long; the upper parts fine light gray; beneath pale buffy-white. It frequently makes its nest in old walls, or in the recesses of rocks. This consists of dry grass, shreds, feathers, and rubbish. The eggs are five or six in number, and of a delicate pale blue. The male has a gentle and pleasing song. Immense numbers of this bird are taken by the shepherds on the downs along the southern coast of England toward the close of summer. One person has been known to capture eighty-four dozen in a day! The mode in which they are taken is singular from its simplicity. A chamber is formed by cutting out an oblong piece of turf, which is then laid over the hole formed in the opposite direction, so as to be supported by its ends, and two passages are also cut in the turf leading into the chamber. Through these the birds run for shelter at the least alarm; but in the middle of the chamber a small, upright stick is placed, supporting two running loops of horse-hair, so arranged that it is almost impossible for a bird to pass through the chamber without getting his neck into one of the nooses. This species is found in Greenland, and probably in North America, being called the AMERICAN STONE-CHAT, *S. œnanthoides*, by Cassin.

Genus PHŒNICURA: *Phœnicura.*—This includes the REDSTART, *P. ruticilla*, a summer visitor to Europe, five and a half inches long, lead-gray above, beneath pale chestnut. It is a sweet and indefatigable singer, and may be heard as late as ten o'clock at night, and as early as three in the morning. The skirts of woods, lanes and meadow hedgerows, orchards, gardens, the old ivied wall of a ruin, are all favorite haunts. The male shows himself, as if proud of his pretty plumage, while he is uttering his soft, sweet song, vibrating his tail the while, on some low branch of a tree, or weather-beaten stone, nor does his music cease as he flies to another station to continue his strain. A crevice in a wall, a hollow tree, a nook in a building, or sometimes a hole in the ground, receives the nest, the outside of which is rough and rich with moss, and lined with hair and feathers. Four, six, and even eight greenish-blue eggs are deposited, and the first brood, for there are generally two in a season, are frequently fledged by the second week in June. The

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food consists of worms and insects, fruit and berries. In confinement this bird becomes exceedingly tame, and if brought up from the nest, is the most sensible and attached of all the small birds.



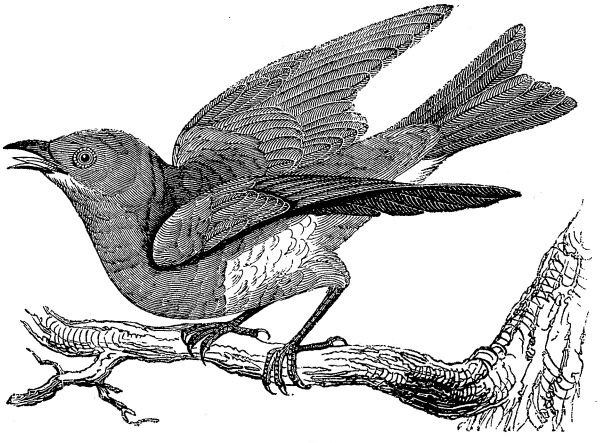
THE BLACK REDSTART.

The BLACK REDSTART, *P. tithys*, is five and three-quarter inches long, and resembles the preceding.

The BLUE-THROATED WARBLER, *P. Suecica*, migrates to Europe from the south in the breeding season.

Genus KITTACINCLA: *Kittacincla*, includes the INDIAN NIGHTINGALE, *K. macroura*—called *Shama* by the Bengalese. This bird inhabits the recesses of the forests, and is thought to equal the European nightingale in musical gifts. It sings during the night, when other birds are silent; many thousands of them are kept in cages by the natives of Calcutta, and in order to make them sing they are covered over with folds of cloth. In this condition the Mahometan ladies carry them about in their drives, the birds all the time filling the air with their delicious melodies.

The DAYAL, *Copsychus saularis*—called *Magpie-Robin* by the English residents in Ceylon—seems to take the place of the English robin in their affections, though it is rather noted for its pugnacious disposition. Another species, the INDIAN ROBIN, *Thamnobia fulicata*, is a great favorite both with the natives and the colonists.



THE BLUEBIRD.

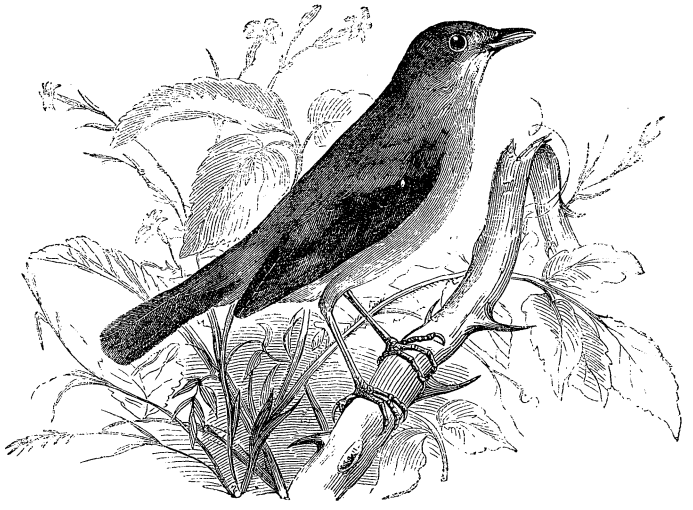
Genus SIALIA: *Sialia.*—This includes the AMERICAN BLUEBIRD, *S. sialis* which is, six and three-quarter inches long; the wings full and broad; the whole upper parts of a sky blue; the breast chestnut; the belly white. It is a summer bird in the United States, coming with the

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earliest spring, and retiring to the south in the autumn. Its food consists of insects and spiders in summer, and berries in winter; its nest is usually made in the hollow limb of a tree, the rail of a fence, or a box about the house or garden, kindly provided by the farmer; the eggs are five to six, of a pale blue color. Nothing can exceed the loving gentleness of these birds in their intercourse with each other. Wilson says: "The usual spring and summer song of the bluebird is a soft, agreeable, and oft-repeated warble, uttered with open, quivering wings, and is extremely pleasing. In his motions and general character he has great resemblance to the robin redbreast of Britain, and had he the brown-olive of that bird, instead of his own blue, could scarcely be distinguished from him. Like him, he is known to almost every child; and shows as much confidence in man by associating with him in summer as the other by his familiarity in winter. He is also of a mild and peaceful disposition, seldom fighting or quarreling with other birds. His society is courted by the inhabitants of the country, and few farmers neglect to provide for him, in some suitable place, a snug little summer-house, ready fitted and rent free. For this he more than sufficiently repays them by the cheerfulness of his song, and the multitude of injurious insects which he daily destroys. Toward fall, that is, in the month of October, his song changes to a single plaintive note, as he passes over the yellow, many-colored woods; and its melancholy air recalls to our minds the approaching decay of the face of nature. Even after the trees are stripped of their leaves, he still lingers over his native fields, as if loath to leave them. About the middle or end of November few or none of them are seen; but, with every return of mild and open weather, we hear his plaintive note amid the fields, or in the air, seeming to deplore the devastations of winter. Indeed, he appears scarcely ever totally to forsake us, but to follow fair weather through all its journeyings till the return of spring."

The Western Bluebird, *S. occidentalis*, is seven inches long; upper parts light blue, chestnut-red, and grayish-white; has a sweet and varied song; found west of the Rocky Mountains.

The Arctic Bluebird, *S. Arctica*, is seven and a quarter inches long; azure blue above; whitish-gray beneath; found on the Columbia River.



THE NIGHTINGALE.

THE SYLVINÆ OR TRUE WARBLERS.

This sub-family presents several genera and numerous species in both hemispheres. They are small, lively, active birds, generally living among trees and bushes, feeding chiefly on insects, but sometimes also on fruit and seeds. Their nests are usually cup-shaped, and neatly constructed; the eggs vary from five to eight; two broods are usually produced in a season. They are migratory, and generally gifted with the power of song; indeed, we find several of the species pre-eminent in this respect.

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Genus SYLVIA: *Sylvia.*—This includes the NIGHTINGALE—a word from the Saxon meaning *Night-singer*—*S. luscinia*—*Luscinia* of the Romans; *Usignuolo* of the Italians; *Rossignol* of the French; and *Nachtigall* of the Germans—the most celebrated of feathered songsters. It is a small bird, about the size of a bluebird; six inches long, and weighs half an ounce, yet its voice in the night can be heard a mile, as far as the loudest voice of man. Its color is a rich brown above, with a reddish tinge on the rump and tail; throat and middle part of the belly grayish-white; the sexes alike. It spends the winter in the warm parts of Asia and Africa, and migrates into Europe, even as far north as Sweden, in April and May. The males proceed first, and on arriving in the regions they intend to occupy, pour out their sweetest and most seductive songs to attract the females. The pairing being arranged, they proceed to their household cares. Although they shun observation, yet their haunts are in gardens and thickets near the abodes of man. They are abundant in the pleasure-grounds around London, and in the parks and gardens in the vicinity of Paris. Florence, in the vocal season, that is, in May and June, rings with them. Nevertheless, they hide themselves in their coverts, placing their nests sometimes in the fork of a tree, often on a wall, and still more frequently on the ground. Withered leaves, particularly those of the oak, very loosely conjoined with dried bents and rushes, and lined internally with fine root-fibers, form the structure. The eggs, of an olive-brown, are four or five in number. After the young are hatched, generally in June, the melodious song of the male ceases, and is succeeded by a low croak, varied occasionally with a snapping noise; the first is considered to be meant for a warning, and the last a defiance. The food consists of insects, such as flies and spiders, moths and earwigs.

The song of the Nightingale has long been the standing theme on which poets have exhausted their eulogiums. Buffon's description has ever been regarded as a most felicitous, though perhaps extravagant eulogium. Bechstein says in a more sober tone: "The nightingale expresses its various emotions and desires in different notes. The least significant of them seems to be the simple whistle, *Witt!* but if the guttural syllable *Krr!* be added, as *Witt Krr!* it is the call by which the male and female mutually invite one another. The expression of displeasure or fear is the syllable *Witt*, repeated several times, and, at last, followed by *Krr!* That of pleasure and content, either with its food or mate, is a sharp *Tack!* like the sound produced by striking the tongue smartly against the roof of the mouth. In anger, jealousy, or surprise, the nightingale, like the black-cap and others of its species, utters a shrill cry, resembling the call of the jay, or the mew of a cat. This may also be heard in the aviary, when a bird, by the use of it, endeavors to interrupt and confuse a rival in the midst of his song. And, lastly, in the pairing season, when the male and female entice and pursue one another through the trees, they utter a soft twittering note.

"Such are the tunes which both sexes are able to produce; while the song, the variety and beauty of which has raised the nightingale to a pre-eminence over all other singing birds, is the prerogative of the male alone. The bystander is astonished to hear a song, which is so sonorous as to make his ears tingle, proceed from so small a bird, and his astonishment is not lessened when he discovers that the muscles of the larynx are stronger in the nightingale than in any other singing bird. But it is not so much the strength, as the delightful variety and ravishing harmony of the nightingale's song, which render it the favorite of every one who has not altogether lost the sense of the beautiful. Sometimes it dwells for a minute or more on a passage of detached mournful notes, which begin softly, advance by degrees to a forte, and end in a dying fall. At other times it utters a rapid succession of sharp, sonorous notes, and ends this, and the many other phrases of which its song consists, with the single notes of an ascending chord. There are, of course, various degrees of proficiency in the nightingale, as in other birds; but in the song of a good performer have been enumerated, without reckoning smaller distinctions, no less than twenty-four separate phrases, capable of being expressed in articulate syllables and words.*

"It is a pity that the period during which the nightingale sings is so short, as even in a wild state it sings only for three months, and not with equal vigor during the whole of that short time.

* See p. 13; where the result of an attempt to put the Nightingale's song into words is given.

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It is heard most frequently from the time of its arrival till the young birds break the shell; after that period it sings less, and with less energy, as its principal attention is necessarily directed to the feeding of its brood. About midsummer its song ceases altogether, and one hears in the woods only the twittering of the young birds, in their attempts to acquire the paternal song. In confinement, birds which have been taken when old begin to sing as early as November, and do not become entirely silent till Easter. The young birds, however, which have been reared from the nest, will sometimes, if placed under good instruction, sing for seven months in the year. If not hung where they can hear a good singer, they never acquire their natural song perfectly, but intermix with it notes of other birds; while, on the other hand, if possessed of a good voice and memory, they sometimes improve upon the instructions of their teacher. This, however, is a rare occurrence, as out of twenty young birds reared in the aviary, it is doubtful if even one prove a thoroughly good singer. The best are those which are caught in August, just before their migration, and which, in the following spring, are put under the tuition of an accomplished singer."

The GREAT NIGHTINGALE, *S. philomela* of Bechstein, is six inches and a half long, dark brown above, and light below; its song is less varied and less agreeable than the preceding; found in the eastern countries of Europe, and in Asia, along the borders of the Mediterranean.

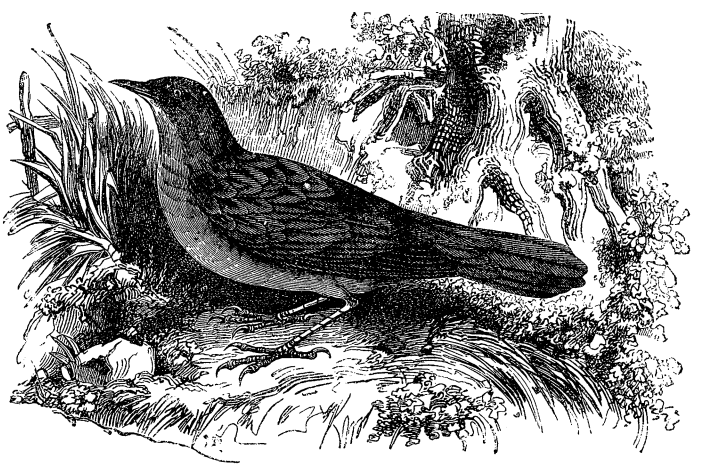
The WOOD-WARBLER, *S. sylvicola:* this is five and a quarter inches long; olive-green, tinged with sulphur-yellow, above; beneath white; common in Middle and Southern Europe.

The WILLOW-WARBLER, *S. trochylus*, is five inches long; dull olive-green above; beneath yellowish-white; common throughout Europe. This is the *Willow Wren* or *Sylvia trochylus* of Nuttall; the *Regulus trochylus* of De Kay: said to be found also in the Southern States.

The MELODIOUS WILLOW-WARBLER, *S. hippolais*, is five and a half inches long; green, tinged with ash-brown above; beneath sulphur-yellow; distinguished for its pleasing and varied song; found throughout Europe.

The CHIFF-CHAFF, *S. rufa*, is four and three-quarter inches long; ash-brown above; dull brownish-white beneath; found throughout Europe.

The RAYED WARBLER, *S. nisoria* of Bechstein—*Fauvette Epervier* of the French—is six and a half inches long; inhabits the north of Europe; the *S. provincialis* is four and half inches long; is permanent in Southern Europe, and is accidentally found in France; *S. Cetti—Rossignol des Marais* of the French—five inches long; found in Europe on the borders of the Mediterranean; the *S. fluviatilis*, five and a half inches long; found on the borders of the Danube.

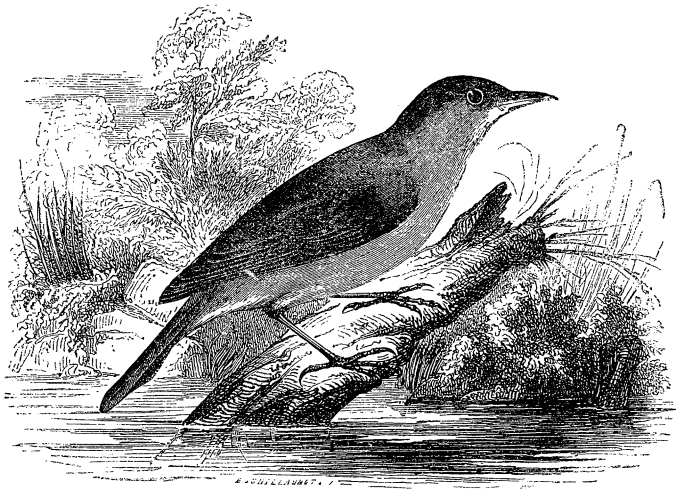


THE GRASSHOPPER-WARBLER.

Genus SALICARIA: *Salicaria.*—This includes several species of Warbler, among which we may name the GRASSHOPPER-WARBLER, *S. locustella*, deriving its name from its incessant cricket-like note; five and a half inches long; greenish-brown above; pale brown, spotted, beneath; found throughout Europe; the THRUSH-LIKE WARBLER, *S. turdoides*, eight inches long; light brown above; white beneath; found in Middle and Southern Europe; the SEDGE-WARBLER, *S.*

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phragmitis, four and three-quarter inches long; reddish-brown above; buff below; noted for singing at night, and imitating the notes of other birds; SAVI'S WARBLER, *S. luscinoïdes*, five and a half inches long; reddish-brown above; pale brown beneath; a rare species in Southern Europe. The REED-WARBLER, *S. arundinacea*, five and a half inches long; pale brown above; pale buff below; has a pleasing and varied song, sometimes repeated at night, and is noted for making its nest upon several branches of reeds rising out of the water, this being formed by winding long grass horizontally round and round, with a mixture of wool and small reed-branches, the whole being lined with fine grass and long hairs; found in Middle and Southern Europe; the RUFOUS SEDGE-WARBLER, *S. galactotes*, is seven inches long; fawn-color above; delicate fawn beneath; found in Southern Europe.



THE REED-WARBLER.

Genus CURRUCA: *Curruca.*—This includes the BLACK-CAP WARBLER, *C. atricapilla*, five and three-quarter inches long; the head black; body ash-brown above; white beneath; inferior only to the nightingale in the quality of its song; found throughout Europe: the GARDEN-WARBLER or GREATER PRETTYCHAPS, *C. hortensis*, six inches long; brown above; brownish-white beneath; and noted for its wild and rapid but mellow song; found throughout Europe: the COMMON WHITE-THROAT, *C. cinerea*, five and a half inches long; reddish-brown above; beneath pale brownish-white, tinged with rose; a numerous and common species throughout Europe: the LESSER WHITE-THROAT, *C. sylviella*, five and a quarter inches long; smoke-gray above; beneath white, tinged with red; found throughout Europe: the ORPHEUS WARBLER, *C. Orphea*, six and a half inches long; ashy-gray above; beneath white, tinged with gray.



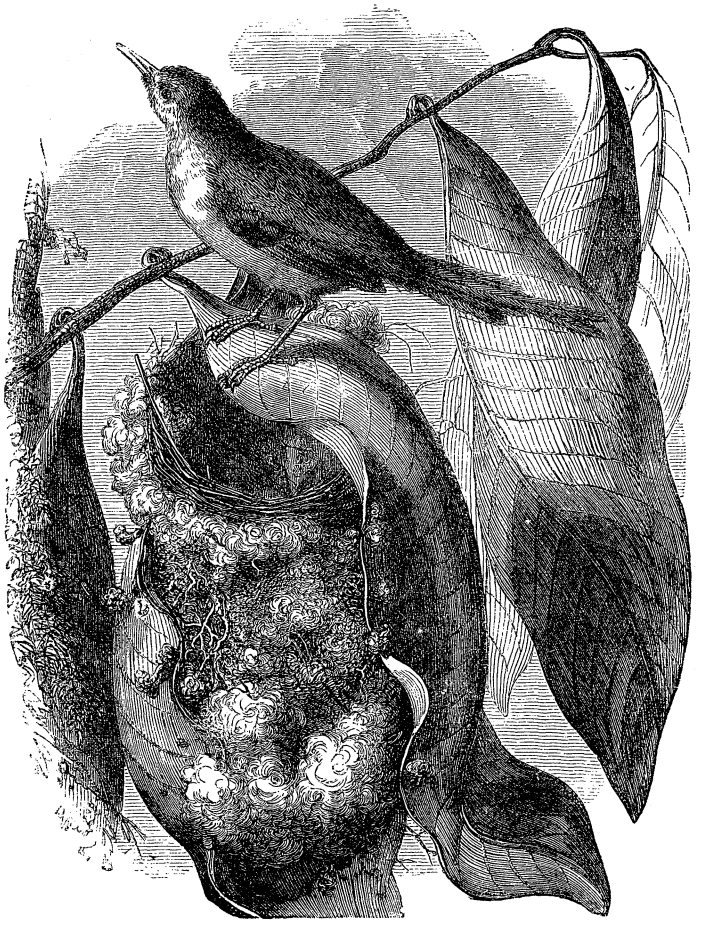
THE GOLDEN-CRESTED REGULUS.

Genus MELIZOPHILUS: *Melizophilus.*—This includes the DARTFORD WARBLER, FURZELING, or FURZE-WREN, *M. Dartfordiensis*, named from being found near Dartford, in England; five inches long; found in Southern Europe; a permanent resident in England, France, &c.

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Genus REGULUS: *Regulus.*—This includes the GOLDEN-CRESTED REGULUS or KINGLET, *R. cristatus—Roitelet huppé* of the French—an exceedingly minute species, three and a half inches long; yellowish olive-green above, and yellowish-gray beneath, the crown of the head being adorned with a yellowish crest, bordered on each side with black. It lives in the woods, and may often be seen associating with tits and creepers. Its nest is a cup-shaped structure of moss, frequently lined with feathers; found throughout Europe: the FIRE-CRESTED WREN, *R. ignicapillus*, is somewhat smaller even than the preceding, its colors being somewhat more brilliant; also common in Europe: the DALMATIAN REGULUS, *R. modestus*, is four inches long; greenish-yellow above, beneath pale yellow; found in Southern Europe.

The AMERICAN GOLDEN-CRESTED WREN or KINGLET, *R. satrapa*, is four inches long; olive-color above; grayish-white tinged with yellowish-brown beneath; found from Mexico to Labrador; breeds in the latter region; migrates into the United States in September, where it spends the winter. These birds associate in groups, each composed of a family, and are seen feeding in company with titmice, nut-hatches, and brown creepers. They are extremely lively and playful, often seizing their insect prey on the wing, as well as upon the leaves and bark of the trees. The RUBY-CROWNED KINGLET, *R. calendula*, is four and a quarter inches long; dull olive above; under parts grayish-white; found in the same regions as the preceding. CUVIER'S KINGLET, *R. Cuvierii*, is four and a quarter inches long; grayish-olive above; grayish-white beneath; found in Pennsylvania.



THE TAILOR-BIRD.

Genus ORTHOTOMUS: *Orthotomus.*—This includes the TAILOR-BIRD—*Sylvia sutoria* of Latham; *O. Bennetii* of Sykes—an East Indian species, nearly five inches long, of an olive-green

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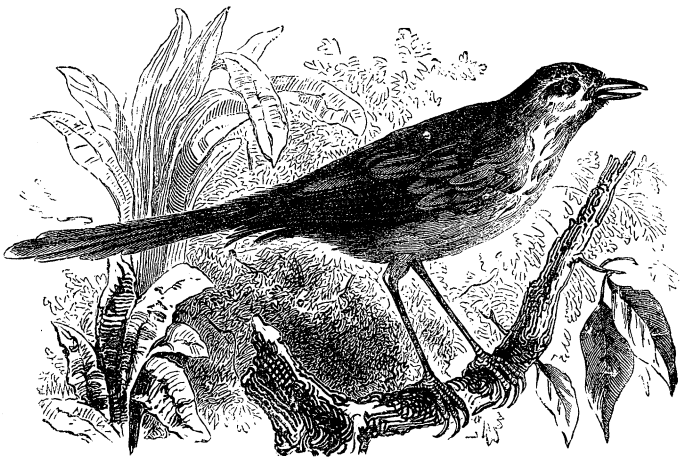
above and white beneath; top of the head bright red. This bird more than any other approaches human art in building its nest; it usually picks up the dead leaf of a tree and regularly sews it to a living leaf by the edges, thus forming a sort of pendulous pouch, which is of course supported by the foot-stalk of the leaf which is still attached to the parent tree. In some cases, however, it employs two contiguous living leaves. The thread used in this operation is in some cases spun from raw cotton by the bird, in others common cotton thread is made use of, and some nests exhibit both these materials. The pouch thus formed is left open at the top, and the bottom is occupied by the nest itself, which is usually composed of cotton and flax, neatly woven together, and lined with horse-hair. In these ingenious little cradles the Tailor-Birds lay their eggs and bring up their young, secure—through the slenderness of their communication with the tree that supports them—from the attacks of the monkeys, snakes, and other enemies, who would otherwise frequently destroy their hopes. Their food consists of insects, which they capture either upon the bark and leaves of trees, or upon the ground. There are still other species.



THE PINC-PINC.

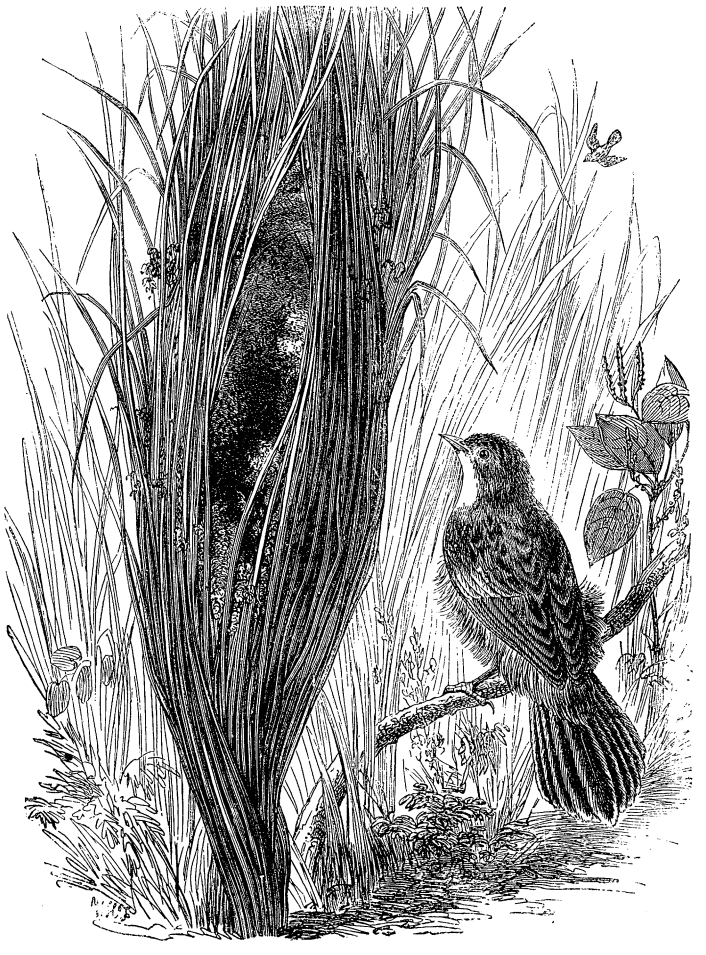
Genus DRYMOICA: *Drymoica.*—This includes the PINC-PINC, *D. textrix*, found in Southern Africa; it is about the size of a wren, which it resembles in its constant activity and the incessant jerking of its tail, at the same time crying *pinc, pinc, pinc;* it is black and brown above, and brown and red below; its nest is externally more than a foot in diameter, consisting of the woolly parts of plants woven compactly together, with an opening in the middle, three inches in width.

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THE SPOTTED WARBLER.

The SPOTTED WARBLER, *D. maculosa*, is a familiar species in Southern Africa; it is a great favorite with the colonists, who permit it to enter their houses and freely pick up the crumbs.



THE CISTICOLE WARBLER.

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THE BLUE-WINGED YELLOW WARBLER.

It is six inches long, its color brown above and yellowish-white beneath. This genus also includes the CISTICOLE WARBLER, *D. cisticola*, four and a half inches long, and celebrated for the ingenuity with which it builds its nest. This is placed in a tuft of strong, coarse grass, and is purse-shaped, with an opening at the side.

Genus EPTHIANURA: *Epthianura*.—The species of this belong to Australia, of which an example is the WHITE-FRONTED EPTHIANURA, dark gray above, white beneath; forehead, face, and throat white.

The *American Warblers* are very numerous, about forty species being known in the United States; far the greater part are migratory, as are their congeners in Europe, moving to the north in spring and to the south in autumn; most of them, however, spending the gay season among us, and enlivening our spring and summer landscapes by their lively sports, their cheerful labors, and their delicious songs. They are embraced by naturalists under the family name of *Sylvicolidæ*, and ranged under several genera.

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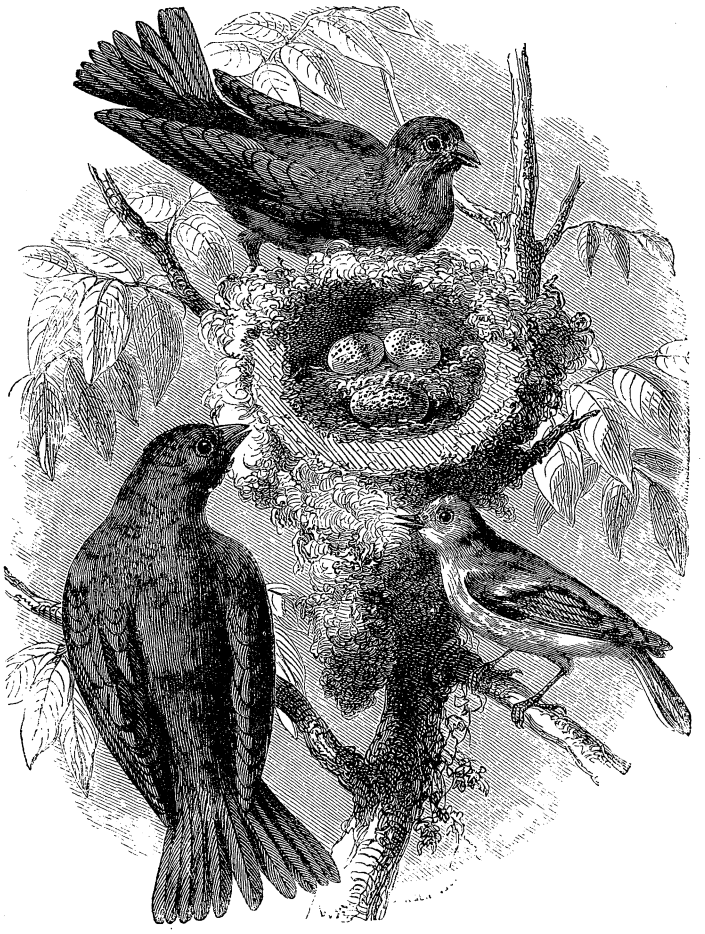
Genus TRICHAS: *Trichas*, includes the *Ground-Warblers*. The YELLOW-THROAT, *T. Marilandica*, is five inches long; olive-green above; beneath yellow; makes an oven-shaped nest, similar to that of the *Golden-crowned Thrush;* lays from four to six eggs; ranges from Mexico to fifty degrees north. This is one of the species in the nest of which the cow-bunting often deposits one of its eggs, in the manner of the European cuckoo. The nest is placed on the ground, and partly sunk in it, and is oven-shaped. The MOURNING-WARBLER, *T. Philadelphia*, is five and a half inches long; olive-green above, yellow beneath; a rare species, of shy and solitary habits; little known: MACGILLIVRAY'S GROUND-WARBLER, *T. Macgillivrayi*, six inches long; olive-green above, bright yellow beneath; found on the Columbia River: DELAFIELD'S WARBLER, *T. Delafieldi*, five and a quarter inches long; olive-gray above, beneath yellow; found in California.

Genus HELINAIA: *Helinaia.*—This includes the *Swamp-Warblers*, according to Audubon, and is equivalent to the *Vermivora* of De Kay, and nearly the same as the *Dacnis* of Cuvier, which includes the *Pit-Pits* of Buffon. The BLUE-WINGED YELLOW WARBLER, *H. solitaria*, is four and three-quarter inches long; grass-green above, bright yellow beneath; found from Louisiana to New Jersey. It frequents gardens, orchards, and willow-trees, and makes its nest in a tussock of long grass, occasionally shielded by a briar, in the form of an inverted funnel. After its northern migration in summer, it retires to tropical America to spend the winter. The WORM-EATING WARBLER, *H. Pennsylvanica*, is five and a half inches long; of a deep olive-green above; beneath buff; found from Carolina to the fur countries. SWAINSON'S WARBLER, *H. Swainsonii*, is five and a half inches long; the upper parts rich brown; under parts brownish-gray; found in the Middle and Eastern States. The PROTHONOTARY WARBLER, *H. protonotarius*, is five and a half inches long; yellowish-green above, pale yellow beneath; found in the Southern and Western States. The GOLDEN-WINGED WARBLER, *H. chysoptera*, is four and a quarter inches long; light ash-gray above and white beneath; found in the Middle and Western States. BACHMAN'S WARBLER, *H. Bachmani*, is four inches long; brownish-olive above, breast yellow, sides greenish-gray, tail-coverts white; found in South Carolina. The CARBONATED WARBLER, *H. carbonata*, is four and three-quarter inches long; upper parts dusky and dull yellowish-green, fore part of the back and sides dusky, lower back yellowish-green, under parts yellow; found in Kentucky. The TENNESSEE WARBLER, *H. peregrina*, is four and a half inches long; yellow-olive above, whitish-cream color beneath; found in the Southern States. The ORANGE-CROWNED WARBLER, *H. celata*, is five and a half inches long; brownish-green above, olive-yellow beneath; found from Mexico to Labrador. The NASHVILLE WARBLER, *H. rubricapilla*, is four and a half inches long; upper parts brownish-green, beneath greenish-yellow; found in the Southern and Western States.

Genus SYLVICOLA: *Sylvicola.*—This includes the *Wood-Warblers*. The SUMMER YELLOW-BIRD, *S. æstiva*, is five inches long; pale yellowish-green above, beneath yellow; common throughout the Atlantic States. The nest, formed externally of hemp, flax, or woolly substances, is strongly fastened to the forked branches of a small tree, usually near a house. It is then lined with hair and feathers. Into this, as it sometimes happens, the insidious cow-bird drops its egg, in the expectation that it will be hatched by the unsuspecting proprietor of the nest. But the little bird perceives the imposition, and weaves above it a matting which covers it, and prevents its receiving the warmth necessary for incubation. The engraving at page 154 represents a section of such a nest, with the parasitic egg below and the lawful eggs above.

The YELLOW-CROWNED WOOD-WARBLER, *S. coronata*, is five and a quarter inches long; ashy-gray above; breast and sides variegated with black; rest of the lower parts white; found throughout the United States. AUDUBON'S WARBLER, *S. Audubonii*, five and three-quarter inches long; in color resembling the preceding; found on the Columbia River. The BLACK-POLL WARBLER, *S. striata*, is five and a quarter inches long; bluish ash-gray, streaked with black above; lower parts white; found from Texas to Labrador. The YELLOW-THROATED WARBLER, *S. pensilis*, is a beautiful species, five and a half inches long; upper parts grayish-blue; throat yellow; breast and lower parts white; found from Texas to New Jersey. The BAY-BREASTED WARBLER, *S. castanea*, is five and a quarter inches long; the head chestnut-red; back bluish ash-gray; lower parts white, tinged with reddish; found from Texas northward. The CHESTNUT-SIDED WARBLER, *S. icterocephala*, is five and a half inches long; bluish-ash above; lower parts white; found from Texas

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THE SUMMER YELLOW-BIRD AND THE COW-BIRD. (See page 153.)

northward; the PINE-CREEPING WARBLER, *S. pinus*, is five inches long; light yellowish-green above, yellow beneath; found from Texas to Maine. The HEMLOCK WARBLER, *S. parus*, is five and a half inches long; yellowish-green above; breast yellow; rest of the lower parts white; common in the Middle States. The BLACK-THROATED GREEN WARBLER, *S. virens*, is five inches long; upper parts light yellowish-green; fore part of the neck black; lower parts white, tinged with yellow; found from Texas to Newfoundland. The CAPE MAY WARBLER, *S. maritima*, is five and a half inches long; head and part of the back yellowish-olive; other portions above yellow; lower parts yellow, streaked with black; a rare species; found in New Jersey and Vermont. The BLUE-GRAY WARBLER, *S. cærulea*, four and a half inches long; upper parts fine light blue; lower parts white; found from Texas northward. The BLACKBURNIAN WARBLER, *S. Blackburniæ*, is four and three-quarter inches long; black, streaked with white, above; breast dull yellow; the rest white; found from Texas northward. RATHBONE'S WARBLER, *S. Rathbonii*, is four and a half inches long; general color bright yellow; found in Mississippi. The YELLOW RED-POLL WARBLER, *S. petechia*, is four and a half inches long; yellowish-olive, streaked with brown, above; lower parts yellow; an abundant species from Texas northward, spending the winter in the Southern States. The BLUE YELLOW-BACKED WARBLER, *S. Americana*, is four and a half inches long; light blue above; breast yellow; lower parts yellowish-white; it is a beautiful species; found throughout the United States. The HERMIT WARBLER, *S. occidentalis*, is three and a half inches long; the upper parts bluish-gray; throat black; breast and abdomen white; found on

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the Columbia River. The BLACK-THROATED GRAY WARBLER, *S. nigrescens*, is five inches long; upper parts bluish ash-gray; portion of the breast black; the lower parts white, tinged with gray; found on the Columbia River. The BLACK-THROATED BLUE WARBLER, *S. Canadensis*, is five inches long; light blue above; white beneath; and found from Texas northward. The BLACK AND YELLOW WARBLER, *S. maculosa*, is five inches long; neck and head ash-gray; back and upper tail-coverts black; lower parts and rump yellow; found from Texas northward. The PRAIRIE WARBLER, *S. discolor*, is five inches long; upper parts yellowish-green; lower parts bright yellow; found from Texas to Massachusetts. The BLUE MOUNTAIN WARBLER, *S. montana*, is four and a half inches long; upper parts greenish-olive; lower parts yellowish-olive; found in the Blue Mountains of Virginia, and west of the Rocky Mountains. The CONNECTICUT WARBLER, *S. agilis*, is five and three-quarter inches long; olive-green above; breast ash-gray; rest of the lower parts bright yellow; a rare species; found from Connecticut to New Jersey. The ORANGE-BREASTED WARBLER, *S. olivacea*, is found in Texas and Mexico. KIRTLAND'S WARBLER, *S. Kirtlandii*, is found in Ohio.

Genus MNIOTILTA: *Mniotilta.*—This includes the BLACK AND WHITE CREEPING-WARBLER, *M. varia*, five and a half inches long; the back and breast streaked with black and white; found throughout the United States. It builds its nest on the ground, lays from three to five eggs, and seems to combine the habits of the creeper and warbler.

Genus MYIODIOCTES, or WILSONIA: *Myiodioctes.*—This includes the *Fly-catching Warblers:* the HOODED WARBLER, *M. mitratus*, is five and a half inches long; upper parts yellowish-olive; beneath yellow; found in the Middle and Southern States: the CANADA FLY-CATCHER, *M. Canadensis*, is five and a quarter inches long; ash-gray above; beneath yellow; found in the Western States: BONAPARTE'S WARBLER, *M. Bonapartii*, five and a quarter inches long; upper parts grayish-blue; lower parts ochre-yellow; found in Kentucky: the KENTUCKY WARBLER, *M. formosus*, is five and a half inches long; upper parts yellowish-olive; beneath bright yellow; common in the Southern States; rare in the Western: WILSON'S WARBLER, *M. Wilsonii*, is four and a half inches long; upper parts yellowish-green; beneath bright yellow; found from Texas to Labrador.

CONIROSTRES.

In the birds of this division,* as already stated, the bill is of a more or less conical form—sometimes short, very thick at the base, and rapidly diminishing at the tip; in other cases it is more elongated and tapering, and sometimes slightly curved. The tip of the upper mandible is usually entire, but occasionally there is a slight tooth on each side near the extremity. The wings are generally rather long and pointed, the tarsi long, and the toes of moderate length, the outer one being frequently united at its base to the middle one. This group includes the essentially granivorous birds, but a considerable number of the species are not confined to a grain diet; many of them feed upon fruits and insects, and larvæ form a portion of the nourishment of most of the species. Some appear to feed upon almost any animal or vegetable substances that come in their way, these constituting the greater part of the order of *Omnivores*, according to some naturalists. Among the families and sub-families included in this extensive division are the following: the FRINGILLIDÆ, including the *Weaver-Birds*, *Grosbeaks*, *Tanagers*, *Sparrows*, *Linnets*, *Finches*, *Buntings*, *Larks*, *Bull-Finches*, *Cross-Bills*, and *Plant-Cutters;* the STURNIDÆ, including the *Glossy Starlings* or *Bower-Birds*, *Grackles*, *Ox-Peckers*, the *True Starlings*, *Meadow-Lark*, *Blackbirds*, *Baltimore Oriole*, *Orchard Oriole*, *Red-winged Oriole*, *Cow-Bird*, and *Boblink;* the BUCERIDÆ or *Horn-Bills;* the MUSOPHAGIDÆ or *Plantain-Cutters;* the COLIIDÆ or *Colies;* the CORVIDÆ, including the *Piping-Crows*, the *Jays*, the *Tree-Crows*, the *True Crows*, the *Raven*, *Rook*, *Jackdaw*, *Magpie*, *Chough*, *Birds of Paradise*, &c.

THE FRINGILLIDÆ.

Under this head we shall include the vast family of the Finches, a group of birds which in-

* Cuvier, to whom we are indebted for the divisions of *Conirostres*, *Dentirostres*, *Tenuirostres*, and *Fissirostres*, which we have adopted, added a fifth, that of the *Syndactyli*, in which the two outer toes are united for the greater part of their length; this group, however, included birds of very different descriptions, and has since been suppressed by many authors.

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cludes an immense number of species, exhibiting a great variety of structure and habit. They are characterized by having a short, stout, conical bill, with an acute tip, of which the upper mandible has no notch at the extremity. The tongue is rather fleshy, with the tip horny, and usually more or less slit. The œsophagus forms a small crop, and the stomach a powerful gizzard, indicating, with the peculiar form of the bill, that the food of the birds consists principally of grain. The toes are of moderate length, armed with long curved claws, that of the hinder toe being often longer than the rest. The wings are rather short, and somewhat pointed at the extremity, and the tail is composed of twelve feathers. These birds are active on the wing, their flight being usually effected by a series of jerks or undulations. On the ground they generally progress by hopping with both legs at once. They always pair, and their nests are usually beautifully constructed; some of them are in fact most elaborate and ingenious structures.



THE WIDOW-BIRD.

THE PLOCEINÆ OR WEAVER-BIRDS.

These birds, the *Tesserins* of the French —some of which are so renowned for their ingenious architecture—are mostly inhabitants of Africa, but a few species are found in India and the islands of the eastern archipelago. They are all small birds; their food generally consists of insects and seeds; but one species—those of the genus *Textor* —accompany the buffaloes and perch on their backs, for the purpose of picking off the parasitic insects that infest them.

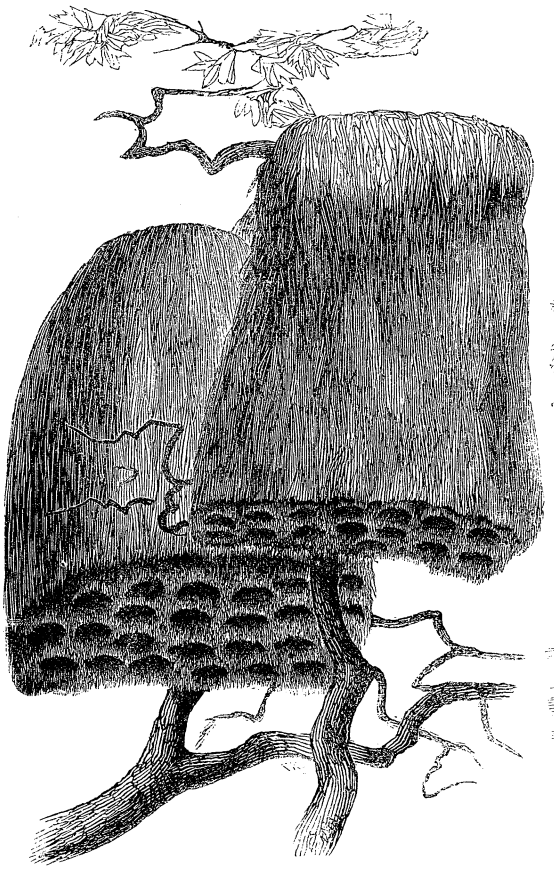
Genus VIDUA: *Vidua.*—This includes the WHIDAH-FINCH or WIDOW-BIRD—*Veuve* of the French—*V. paradisea.* The upper parts are of a deep brownish-black; lower parts pale buff. The bird is about the size of a canary, but in some specimens the tail-feathers of the male are a foot in length. Those of this species are favorites for cages, on account of their extraordinary and not ungraceful appearance; they are found in Senegal and South Africa. The RED-BELLIED WHIDAH-FINCH, *V. erythrorhynchus*, is a smaller species, inhabiting Senegal.

Genus EUPLECTES: *Euplectes.*—This includes a species of which we know but little, except their nests, but these are curious enough. They are most ingeniously woven of grass, in the shape of a chemist's retort, and are suspended from the branch of a tree over a lake, pool, or river, with the mouth down and nearly touching the water. The object of this arrangement is to protect the eggs and young from the monkeys and serpents which abound in these regions.

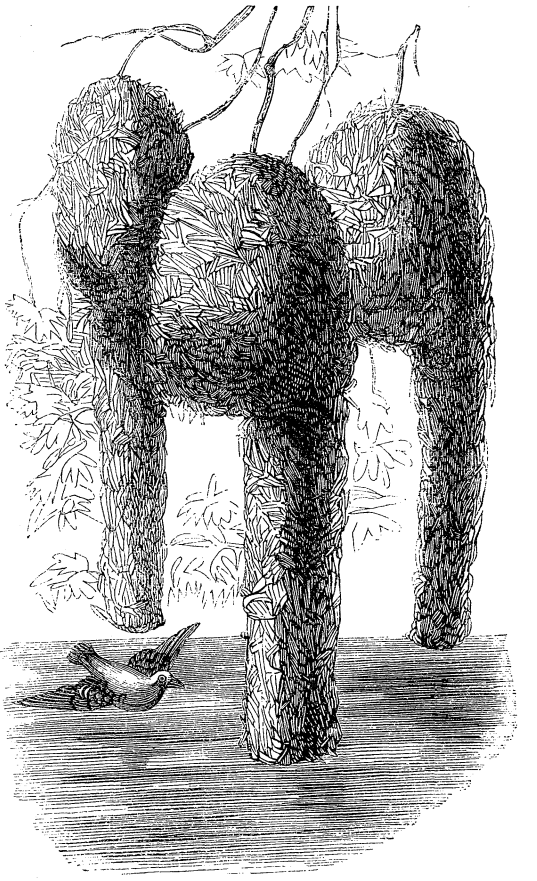
Genus PLOCEUS: *Ploceus.*—This includes the REPUBLICAN WEAVERS or SOCIABLE WEAV-

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ERS, *P. Abyssinicus*—the *Loxia socia* of Latham; *Philetærus lepidus* of Smith—which unite in several hundreds and build a kind of roof or thatch, beneath which they construct their nest. Sometimes a structure of this sort reaches the enormous extent of ten feet square. Each nest is entered from the under side, and is distinct from every other. Paterson, who had an opportunity



NESTS OF SOCIABLE WEAVERS.

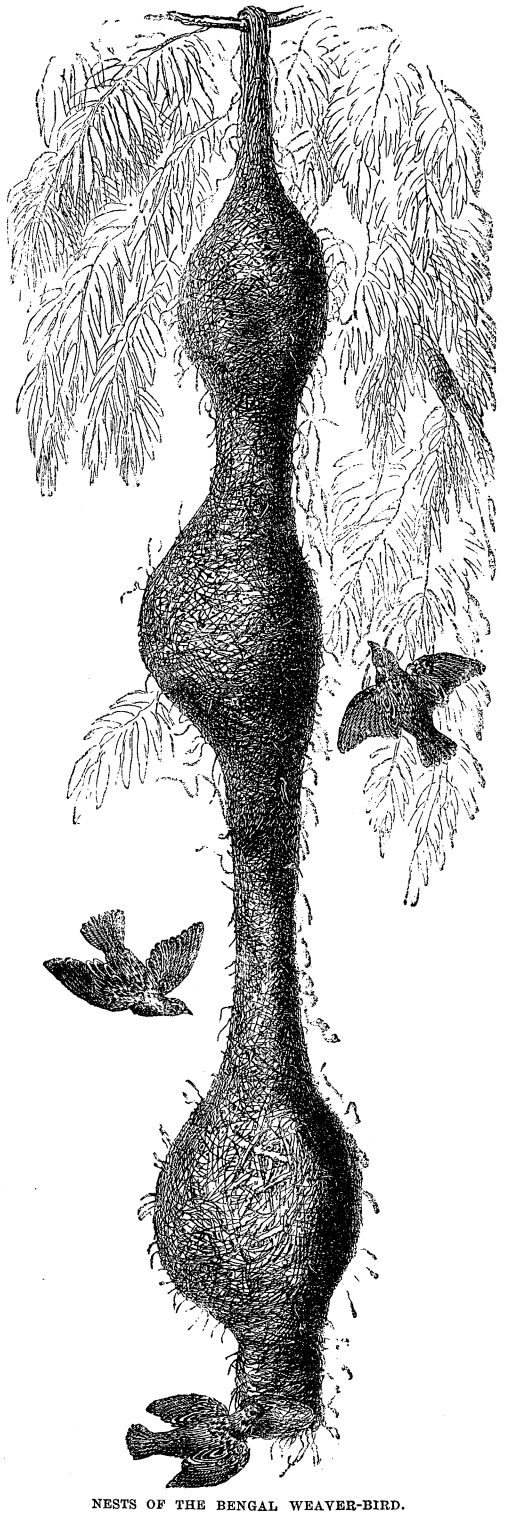


NESTS OF THE GENUS EUPLECTES.

of examining some of these bird-towns, thus describes the operations of the winged citizens: "The industry of these birds seems almost equal to that of the bee. Throughout the day they appear busily employed in carrying a fine species of grass, which is the principal material they employ for the purpose of erecting this extraordinary work, as well as for additions and repairs. Though my short stay in the country was not sufficient to satisfy me by ocular proof that they added to their nests as they annually increased in their numbers, still, from the many trees which I have seen borne down by the weight, and others that I have seen with their boughs completely covered over, it would appear that this is really the case. When the tree that is the support of this aerial city is obliged to give way to the increase of weight, it is obvious that they are no longer protected, and are under the necessity of building in other trees. One of these deserted nests I had the curiosity to break down, to inform myself of the internal structure of it, and found it equally ingenious with that of the external. There are many entrances, each of which forms a regular street, with nests on both sides, at about two inches' distance from each other. The grass with which they build is called the Boshman's grass, and I believe the seed of it to be their principal food, though, on examining their nests, I found the wings and legs of different insects. From every appearance, the nest which I dissected had been inhabited for many years, and some parts were much more complete than others. This, therefore, I conceive to amount nearly to a

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proof that the animals added to it at different times, as they found it necessary, from the increase of their family, or rather of the nation and community."



NESTS OF THE BENGAL WEAVER-BIRD.

Dr. Smith states that the banks of the Orange River appear to constitute the southern limit of the range of this species, which was only obtained in great abundance in the districts around Latakoo, far from water. "The most striking peculiarity," he adds, "observed in this species is the extraordinary manner in which a number of individuals associate, and build their nests under a common roof. When a nestling place has been selected, and the operation of building the nests is to be commenced *ab initio*, the community immediately proceed conjointly to construct the general covering which interests them all; that being accomplished, each pair begin to form their own nest, which, like the roof, they construct of coarse grass; these are placed side by side against the under surface of the general covering, and by the time they are all completed, the lower surface of the mass exhibits an appearance of an even horizontal surface, freely perforated by small circular openings. They never use the same nests a second time, though they continue for many years attached to the same roof. With the return of the breeding season, fresh nests are formed upon the lower surface of those of the preceding year, which then form an addition to the general covering. In this manner they proceed year after year, adding to the mass, till at last the weight often becomes such as to cause the destruction of its support; upon which a new building is selected. They appear to prefer constructing these nests upon large and lofty trees, but where such do not occur, they will even condescend to form them upon the leaves of the arborescent aloe, as occasionally happens toward the Orange River. The commencement of the roof is firmly interwoven with the branches of the trees to which it is intended to be suspended; and often a great part of a principal branch is actually included within its substance. These birds are of a reddish-brown, and of the size of a bull-finch. Each female lays from three to four eggs, which are of a bluish-white color, and freely mottled toward the large end with small brown dots. When once this species has attained maturity, it never afterward exhibits any change in respect to colors. The male has no summer tints which he throws aside in winter, as is the case in *Euplectes*. Seeds, and occasionally small insects, constitute the food."

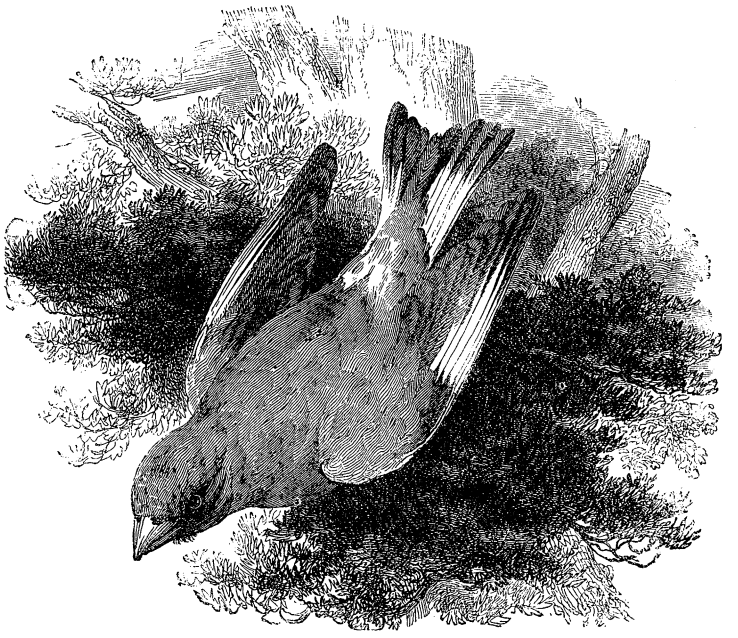
The *P. flaviceps*, inhabiting the southeast coast of Africa, forms kidney-shaped nests, attached to

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the branches of trees over the water; these are so closely woven as completely to exclude the weather; the *P. Capensis* builds similar nests, sometimes five or six being suspended from a single branch. There are still other African species, noted for the peculiar forms of their nests and the ingenuity displayed in erecting them.

The *Textor erythrorhynchus* is a South African species, of the size of a sparrow, which chiefly subsists on parasitic insects which it picks out of the backs of buffaloes. It is said also to give notice to the wild buffaloes of the approach of danger by suddenly flying up in the air. The *Buphaga Africana* and *B. erythrorhynchus* feed in a similar manner from the back of the rhinoceros.

The BENGAL WEAVER-BIRD, *Loxia Bengalensis*, is five inches long, brown above and yellowish-white beneath, and builds its nest in the shape of a purse, suspending it over the water to the outer branch of a tree, the entrance being from below. The next year the bird builds a new nest, suspending it from the bottom of this, and the next year another, and so on, so that five or six nests are sometimes seen strung together.



THE GREEN GROSBEAK.

THE GROSBEAKS.

These birds have the bill very large, broad, and thick, and the mandibles nearly equal; they generally inhabit the woods of mountainous countries, and are shy and wild in their nature. They feed on seeds and fruits, and are fond of the kernels of stone-fruit, which their powerful bills enable them to break with facility.

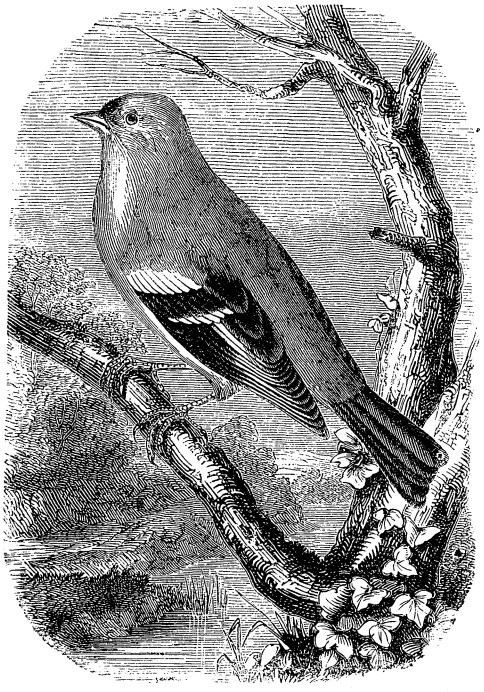
Genus COCCOTHRAUSTES: *Coccothraustes.*—This comprises the COMMON GROSBEAK of Europe, or HAW-FINCH, *C. vulgaris*—*Pinson Gros-Bec* of the French. This bird is seven inches long; is of different shades of brown and gray, variegated with black and white; its eggs are olive-green, five to six in number. It feeds on pollen-stalks, laurel-berries, &c.; found in most parts of Europe; permanent in Italy.

The GREEN FINCH or GREEN GROSBEAK—*Gros-Bec Verdier* of the French—*C. chloris*, is six inches long; upper parts of an olive-yellow; pale yellow beneath; frequents gardens, orchards, small woods, and cultivated lands; has a harsh, monotonous cry, makes its nest on low bushes or hedges, lays from four to six white eggs, and is common throughout Europe. It feeds on seeds, and sometimes on insects.

Under the genus *Loxia* Bechstein includes the following: the PARADISE GROSBEAK. *L. ery-*

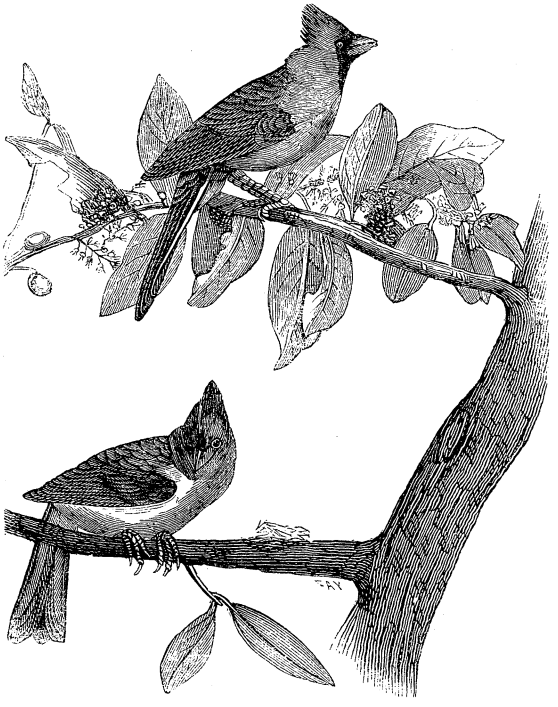
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throcephala, six inches long; found in Angola: the DOMINICAN GROSBEAK, *L. Dominicana*, size of the English lark; found in Brazil: the GRENADIER GROSBEAK, *L. orix*, size of a sparrow; found at the Cape of Good Hope: the CAPE GROSBEAK, *L. Capensis*, six inches long; found at the Cape: the CAFFRARIAN GROSBEAK, *L. Caffra*, size of a bull-finch, with a tail twice as long as the body; found in Caffraria: AZURE-BLUE GROSBEAK, *L. cyanea*, size of the preceding; found in Angola: YELLOW-BELLIED GROSBEAK, *L. flaviventris*, five inches long; found at the Cape: the GOWRY GROSBEAK, *L. punctularia*, four and a quarter inches long; found in Java: the BANDED GROSBEAK, *L. fasciata*, size of the preceding; found in Africa: the BROWN-CHEEKED GROSBEAK, *L. canora*, four inches long; found in Mexico: the MALACCA GROSBEAK, *L. Malacca*, four and a half inches long: the BLACK-CLOUDED GROSBEAK, *L. nubilosa*, size of a house-sparrow; found in Africa: the RED-BILLED GROSBEAK, *L. sanguinirostris*, found in Africa.



THE HAW-FINCH.

The CARDINAL GROSBEAK, *C. cardinalis*—*Pitylus cardinalis* of De Kay—is an American bird, noted for its beautiful song, and sometimes called the *Virginia Nightingale*. Its length is eight inches; the whole upper parts dusky red, except the sides of the neck and head, which, with the whole lower parts, are a clear vermillion. The chin, front, and lores are black, the head being ornamented with a high, pointed crest. It passes under the various names of *Redbird*, *Crested Redbird*, and *Mexican Tanager*. It is frequently kept in cages; is a permanent resident from Maryland to Mexico, and occasionally seen as far north as Massachusetts. The *C. vespertina*, yellow above, white beneath, is eight inches long, and found in Texas and the Western States. The TEXAN CARDINAL-BIRD—*Cardinalis sinuatus* of Cassin—is a new and beautiful species.



THE CARDINAL GROSBEAK.

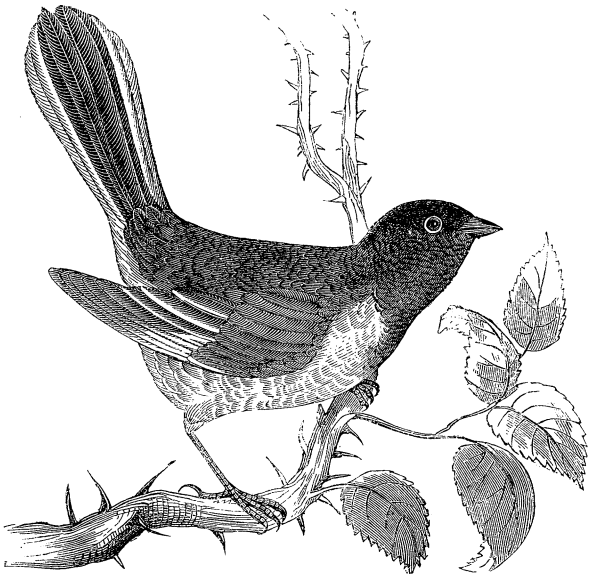
Genus COCCOBORUS: *Coccoborus.*—This includes the BLUE GROSBEAK, *C. cœruleus*, six and a half inches long; blue above, yellowish-brown beneath; a shy and beautiful bird; found from Texas to New York.

The ROSE-BREASTED GROSBEAK, *C. Ludovicianus*, is seven and a half inches long; black and rose-color; found as above.

The *C. melanocephalus*, is eight and a half inches long, head black, body orange-yellow; found in the Rocky Mountains and Texas.

Genus GEOSPIZA: *Geospiza.*—These birds belong to the Gallipago Islands, and are remarkable for the manner of seeking their food upon the ground. They dig up roots and seeds from the depth of six inches in the

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THE CHEWINK.

soil; in the dry season they eat a portion of a species of cactus. Two or three other similar genera are found in these islands—all resembling the grosbeaks.

Genus PIPILO: *Pipilo.*—This includes the CHEWINK, or GROUND-ROBIN, or GROUND-FINCH, *P. erythrophthalma*—the *Towhee Bunting* of Pennant—seven and a half inches long; above black; wings with one or two white bars; breast white; abdomen pale red; sides reddish-brown. It is a common, humble, and unsuspicious bird, living in thickets along the borders of woods, where it may often be seen scratching up the withered leaves for worms and their larvæ, as well as seeds and gravel, frequently crying at the same time *taw-wee, taw-wee, taw-weet.* It flies with a jerking motion, and a frequent flirt of the tail. It conceals its nest on the ground, lays four or five eggs, and is a general inhabitant of Canada and the United States, migrating to the north in the spring and retiring in the autumn.

The CANON-FINCH, *P. fusca*, is nine inches long; olive-brown above; middle of the abdomen white; other lower parts cinereous; makes its nest in the thick branches of a cedar or dwarf oak; haunts shady gorges in mountainous districts; spends much of its time on the ground; its note a simple chirp; found in California and New Mexico. The *P. arctica* builds its nest on the ground; found in Utah. The *P. Aberti* is found in the same region.



THE SCARLET TANAGER.

THE TANAGRINÆ OR TANAGERS.

This is a very extensive sub-family of splendidly colored birds, peculiar to America, and mostly confined to the southern portion of it. Of about two hundred and twenty species, one hundred and ninety-three belong to South America, the remainder to Mexico and Central America; three or four are well-known summer visitors to the United States. They have a curved bill, slightly arched at the tip; their wings and flight are short; they usually collect in troops; feed on insects and fruits; and build their nests on the branches of trees. Most of them have a pleasing song, and some are remarkable for their vocal powers.

Genus EUPHONIA: *Euphonia.*—This comprises the ORGANIST TANAGER, *E. musica*, four

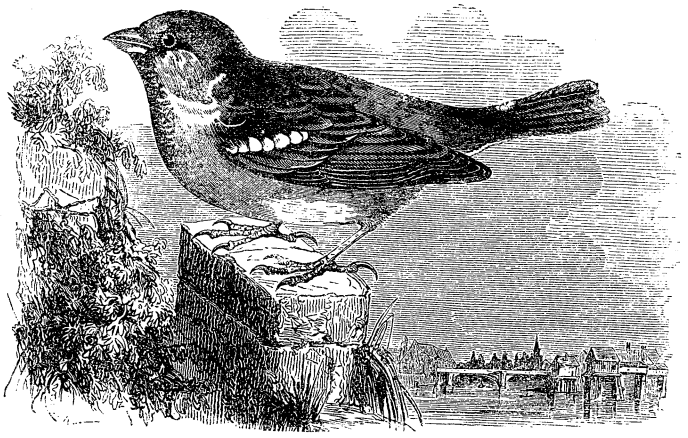
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inches long, the plumage beautifully varied with black and orange; a native of the West Indies. It is celebrated for its charming song.

Genus PYRANGA: *Pyranga.*—This includes the SCARLET TANAGER, or BLACK-WINGED SUMMER REDBIRD, or FIRE BIRD, *P. rubra*, six and a half inches long, the plumage a brilliant scarlet, except the wings and tail, which are black. It arrives among us from its tropical home in April, and extends its migrations to Canada and Nova Scotia. Its food consists of insects, wasps, hornets, wild bees, and beetles; also berries and grapes. This gaudy sylph, as if conscious of its attractions, seeks to hide them in the thickest woods, where it rears its brood. The nest is on the branch of an oak or other tree, and is of slight texture; the eggs are three to four. During incubation the male delivers a highly musical, meandering ditty, often continuing it for hours. The young are attended with the most assiduous care by the parents. These birds depart for the south in August.

The SUMMER REDBIRD, *P. æstiva*, is seven and a half inches long, the whole plumage vermilion: it is a most beautiful and brilliant bird, resembling the preceding in its habits: found from Texas to Canada.

The LOUISIANA TANAGER, *P. Ludoviciana*, is seven inches long, of a greenish-yellow color, head crimson-red, back, wings, and tail black; found in Louisiana.



THE COMMON SPARROW OF EUROPE.

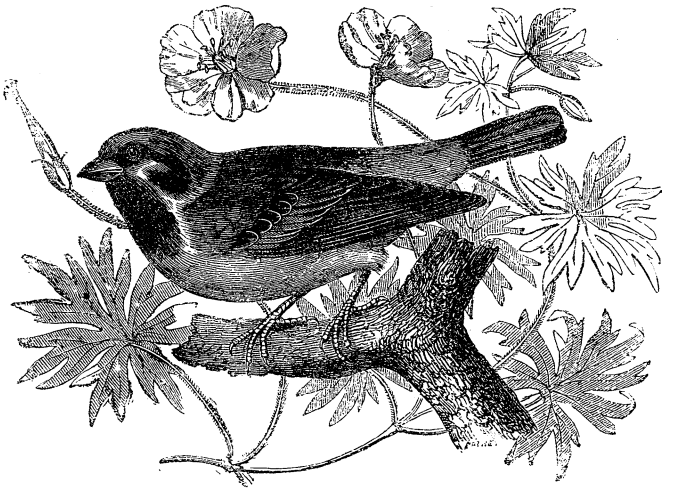
THE SPARROWS.

The *Sparrows*, *Linnets*, *Finches*, and *Buntings* greatly resemble each other, and are often loosely grouped together under the general name of *Finches;* they are also frequently confounded one with another in popular language. We shall proceed to notice them separately.

Genus PASSER: *Passer.*—This includes the COMMON SPARROW of Europe—*Moineau* of the French; *Passero* of the Italians; *Haus-Sperling* of the Germans; *House-Sparrow* of the English—*P. domesticus:* it is six inches long, brown above, beneath pale wood-brown. It is permanent throughout Europe, and is a universal attendant upon man, building its nests as well around the palace as the cottage, in the city as the hamlet. The eggs are five or six, and several broods are reared in a season. Fecundity is indeed one of the characteristics of this bird. The food consists of seeds, insects, caterpillars, young vegetables, and soft fruits. It is a universal favorite, not for any merits of song, but for its lively, confiding manners, and the cheerful ideas its presence imparts. This bird is also known throughout all Northern Asia.

Genus FRINGILLA: *Fringilla.*—This includes the WOOD-SPARROW or TREE-SPARROW of Europe, *F. montana* of Temminck, *Passer montanus* of Yarrell, which is somewhat smaller than the preceding; its color above brown spotted with black, and gray beneath. It lives more aloof from the habitations of man, and in winter may be seen mingling with other sparrows, finches, and buntings. It is found throughout the northern parts of the eastern continent.

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THE WOOD-SPARROW.

The RING-SPARROW, *F. petronia*, is six inches long, grayish-brown above and white beneath; found in Middle Europe.

The AMADAVADE, or AMADUVAT, *F. amadava*, is a small kind of sparrow, scarcely four inches long, brown above and paler beneath, spotted with white; the rump red, the tail and wings black, the bill bright red. It is common in Southern Asia, and is imported into America and Europe in large numbers. It has a pleasing song, and if twenty or thirty are in a cage together they will all sit on one perch and sing in succession.

The JAVA SPARROW, *Oryzornis oryzivora*, five inches long; of a delicate bluish color; feeds on rice; it has a monotonous song of two notes; it is a native of Southern Asia and Java; many are imported into Europe, the bird being valued for its beauty.

The American species of Sparrow are not numerous: the SONG-SPARROW, *F. melodia*, is one of our more common and pleasing species. It is six and a half inches long; above it is streaked with red and brown; lower parts white. It builds on the ground under a tuft of grass; eggs four or five; two or three broods reared in a season. Wilson says: "It may be said to be partially migratory, many passing to the south in the month of November, and many of them still remaining with us in low, close, sheltered meadows and swamps, during the whole of winter. It is the first singing bird in spring, taking precedence even of the pewee and bluebird. Its song continues occasionally during the whole summer and fall, and is sometimes heard in the depth of winter. The notes, or chant, are short, but very sweet, resembling the beginning of the canary's song, and frequently repeated, generally from the branches of a bush or small tree, where it sits chanting for an hour together. It is fond of frequenting the borders of rivers, meadows, swamps, and such like watery places; and if wounded, and unable to fly, will readily take to the water, and swim with considerable rapidity. In the great cypress swamps of the Southern States, in the depth of winter, I observed multitudes of these birds mixed with several other species; for these places appear to be the grand winter rendezvous of almost all our sparrows."

The CHIPPING-BIRD, *F. socialis—Emberiza socialis* of De Kay—is five inches long; frontlet black; ash-colored above; beneath white. Wilson says: "Though destitute of the musical talents of the former species, it is, perhaps, more generally known, because more familiar, and even domestic. He inhabits, during summer, the city, in common with man, building in the branches of the trees with which our streets and gardens are ornamented, and gleaning up crumbs from our yards, and even our doors, to feed his more advanced young with. I have known one of these birds attend regularly every day, during a whole summer, while the family were at dinner under a piazza fronting the garden."

The FOX-COLORED SPARROW, or FINCH, *F. iliaca*, is seven and a half inches long; above varied with reddish-brown and ash; beneath white: found from Texas to Labrador.

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THE SONG-SPARROW.

The GRASS-BIRD or BAY-WINGED SPARROW—*Fringilla graminea* of De Kay—is five and a half inches long; above gray, varied with dusky; breast and flanks streaked with brown; nest placed on the ground; ranges along the Atlantic States from Texas to latitude 57° north; many winter as far north as Pennsylvania. This is the *Grass-Finch* of Nuttall, and the *Bay-winged Bunting* of Audubon.

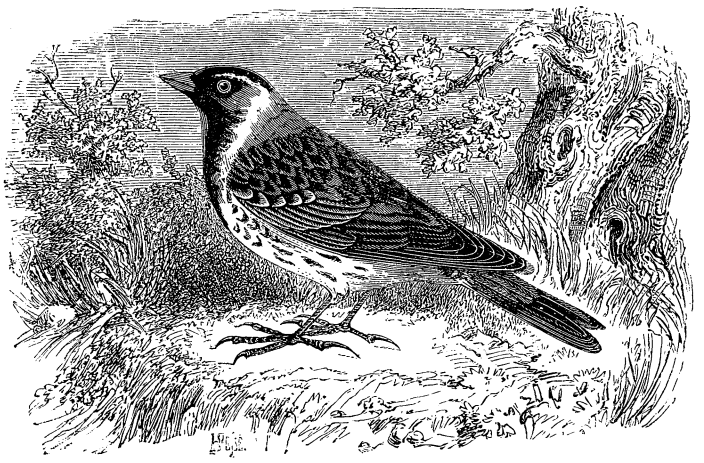
The WHITE-CROWNED SPARROW—*F. leucophrys* of De Kay—six and a half inches long; the head white; above brown and white; beneath pale ash; it is a northern species, migrating south in winter, as far as 28°.

The WHITE-THROATED SPARROW, *F. Pennsylvanica*, is six inches long; above rufous, black and olive-brown; beneath slate color; found, in winter, in Maryland and Pennsylvania; in summer, from Texas to Canada.

Other species are the *F. bicolor*, seven inches long; found on the Western prairies: *F. atricapilla*, eight inches long; found on the Rocky Mountains: *F. cinerea*, six inches long; found in Texas and on the Columbia River: *F. Townsendii*, seven inches long; found in the Rocky Mountains: *F. Mortoni*, five and a half inches long; found in California: *F. Texensis*, four and a half inches long; found in Texas: *F. Harrisi*, seven inches long; found on the upper Missouri. Several of the preceding are ranged by Audubon and some others under the name of *Finches*.

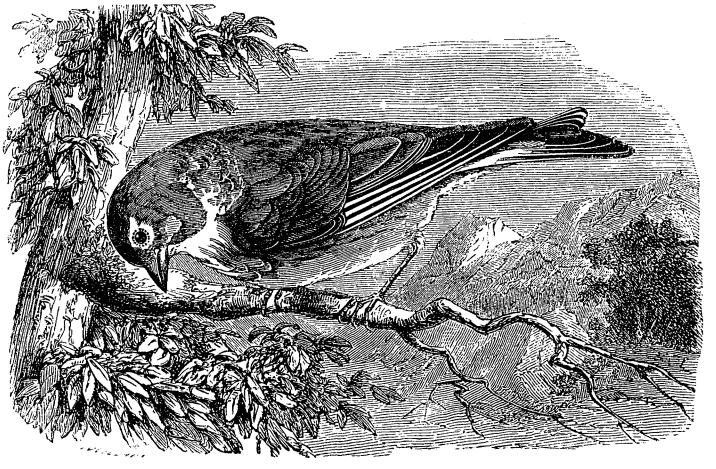
Genus STRUTHUS: *Struthus*.—This includes the COMMON SNOW-BIRD of Europe and the United States: the SNOW-BUNTING, or SNOW-FOWL of England—*Snow-Flake* of the Hebrides; *Tawny-Bunting* of Pennant—*S. hyemalis*—*Plectrophanes nivalis* of Yarrell—six inches long; color bluish-black; abdomen and lateral tail-feathers white; it is a shy, timorous bird, seldom seen except during snow-storms, when it appears in flocks around the houses. At this time it presents much diversity of plumage, some being almost white, and others partially white. It is a northern

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THE COMMON SNOW-BIRD.

bird, common to both continents, being found as far north as Greenland, Spitzbergen, the Faroe Islands, and Lapland. It migrates southward, always by night, on the approach of winter, and some go as far as England and France in Europe, and Virginia in America. Although they mostly breed in high northern regions, still some nests are found in most of the northern Atlantic States. The eggs, usually four, are yellowish white, spotted. These birds feed on grass-seeds, berries, insects, and larvæ. The *S. Oreganus*, six inches long; reddish-brown above; black below; is found on the Columbia River and in Texas.



THE COMMON LINNET OF EUROPE.

THE LINNETS.

Genus LINOTA: *Linota.*—This includes the COMMON LINNET of Europe, *L. cannabina*—*Linotte* of the French—four and three-quarter inches long; chestnut-brown above; breast red; under parts pale wood-brown. It is a gay and active bird, with a sprightly and agreeable song, its voice being loud and flute-like; it is fond of the seed of flax, whence its popular name; it feeds also on various other seeds. The nest, made of twigs and grass, lined with wool, is usually placed in a furze or other bush. It is common all over Europe; it is familiarly known in England, whence we find constant reference to it in English literature. The variations of plumage which occur in this bird at different seasons and periods of life, have caused it to be known by the various names of the *Brown*, *Gray*, and *Rose Linnet;* it is also called the *Whin Linnet*, the *Greater Redpole*, and

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the *Lintie* or *Lintwhite*, the last two being terms applied to it in Scotland more particularly; in the poetry of Burns, and other sweet singers of the north, these names frequently occur:

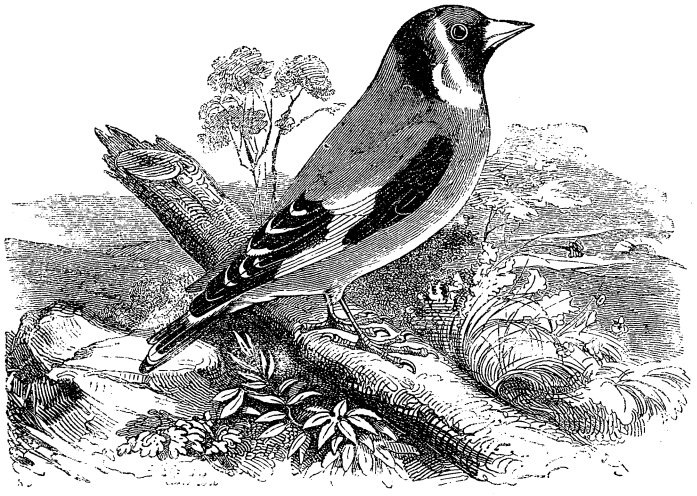
"I wadna gie the *Lintie's* sang
Sae merry on the broomy lea,
For a' the notes that ever rang
From a' the harps o' minstrelsie.
Mair dear to me, where bush or breer
Amang the pathless heather grows,
The *Lintie's* wild sweet note to hear,
As on the ev'nin' breeze it flows."

The Linnet is a permanent inhabitant of Middle and Southern Europe, frequenting the sea-shore in mid-winter.

The MEALY REDPOLE, or RED-POLL, *L. canescens*, is five and a quarter inches long; it has a mixture of dark and light brown above; beneath pale brownish-white, streaked with brown; crown crimson; Yarrell says it feeds on the seeds of forest trees, and De Kay on berries; it is distributed throughout the northern parts of Europe, Asia, and America; found, though rarely, in England, where it is sometimes called *Stone-Redpole*. It appears occasionally in the United States as far south as New York and New Jersey.

The LESSER REDPOLE, *L. linaria*, is four and a quarter inches long; a mixture of dark and light brown above; breast red; under parts brownish-white; feeds on the buds of trees. It is a hardy northern species, found in both continents, inhabiting even Lapland, Greenland, and Spitzbergen, and is a permanent resident of the Fur Countries. In the winter, numbers of them migrate southward, proceeding in the United States as far as Pennsylvania, at this time moving in considerable flocks; in Europe it proceeds south as far as Rome and Sicily. This and the preceding are arranged by Audubon and De Kay under the generic name of *Linaria*.

The MOUNTAIN LINNET, *L. montium*, is five inches long, the tail being of unusual length; dark and light brown above; dull brownish-white beneath; feeds on small seeds; inhabits Europe generally; moves from the northern regions in winter to the south in flocks with sparrows and snow-buntings. It frequently repeats the note *twite, twite*, whence this word is one of its popular English names.



THE COMMON GOLDFINCH OF EUROPE.

THE FINCHES.

Genus CARDUELIS: *Carduelis*.—This includes the COMMON GOLDFINCH or THISTLE-FINCH of Europe—*Chardonneret* of the French—*C. elegans*, five inches long; top of the head black; above brown; beneath white. It has a gay plumage, lively habits, and an agreeable song, and is a general cage favorite; it frequents gardens; builds its nest in a thick bush; eggs four to five.

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This bird, as well as linnets and canaries, has been taught to perform various ingenious tricks; it is common throughout Europe.

The Siskin, *C. spinus*, is four and a half inches long; greenish-olive above, streaked with dusky black; beneath yellowish-green; feeds upon seeds. It is an attractive bird in regard both to its plumage and its song, the latter being generally little more than a continuous chirrup, resembling the noise made by a stocking-loom, a peculiarity which renders it a favorite with stocking-weavers. It imitates the songs of tits, larks, and chaffinches, but does not seem able to learn to whistle a tune. It sings throughout the year, except during the moulting season, and by its continual twittering invites all the birds in the aviary to sing. When taken, it feels the loss of freedom so little as to eat as soon as put into the cage, and on the second day to manifest no sign of alarm if any one approaches. It may be taught to draw water, and many tricks of a similar character; and in winter may be trained to come and go, by placing the cage outside the window, and strewing poppy and hemp-seed before the open door. It generally comes back, and brings several comrades with it. It breeds in confinement, and paired with canaries produces a hybrid valued for its song. The Siskin is a northern European bird, migrating to the south in winter, and returning in the spring.

The Canary-Bird or Canary-Finch—*Fringilla Canaria* of Bechstein—is a native of the Canary Islands, where it breeds on the banks of rivulets. It is said to have been introduced from thence into Europe in the sixteenth century by a ship bound for Leghorn, and which foundered near the island of Elba. Being here set at liberty, they bred on this island; from thence they were taken to Italy, and in the course of years spread over Europe. The original color of the bird was gray, inclining to green on the lower parts of the body, but this has undergone a complete alteration from domestication and change of climate. The length of this bird is five inches; mules have been obtained by breeding with the goldfinch, siskin, green-finch, serin-finch, linnet, lesser redpole, and citril-finch, and these hybrids propagate their kind.

The canary has always been a favorite cage bird, not only on account of the beauty of its plumage and the excellence of its song, but also for its docility, affectionate disposition, and the readiness with which it breeds in confinement. Another source of gratification connected with this bird is the observation of its peculiarities of disposition. Some are melancholy, others lively; some of a peaceful, others of a quarrelsome disposition; some docile, others stupid; some eager to pair, others delighting in solitude, &c. Their chief recommendation, however, consists, beyond doubt, in their loud, lively, and various song, which is continued throughout the year in some cases, even in the moulting seasons. Some, which are very much esteemed, will sing even at night, if a light be placed near their cage; a peculiarity which, though natural in some, is in most the result of long training. The singers of the Tyrol, so called from the country where they are caught, which imitate the nightingale's song, are considered to hold the first rank; and next to these the English canaries, which have acquired the warbling of the wood-lark. In Thuringia those are most esteemed which, instead of a sonorous song of their own, have been taught to descend through the notes of an octave in a clear silvery tone, occasionally introducing a trumpet-like song.

Buffon contrasts the canary and nightingale as follows: "If the latter is the enchantress of the woods, the former is the musician of the chamber. The first owes all to nature; the second derives something from our arts. With less strength of organ, less compass of voice, and less variety of note, the canary-bird has a better ear, greater facility of imitation, and more memory; and as the difference of genius, especially among the lower animals, depends in a great measure on the difference that exists among them with regard to the perfection of their senses, the canary-bird, whose organ of hearing is more attentive, and more susceptible of receiving and retaining foreign impressions, becomes accordingly more social, more tame, and more familiar. It is capable of gratitude, and even of attachment; its caresses are endearing, its little humors are innocent, and its anger neither hurts nor offends. Its education is easy; we rear it with pleasure, because we are able to instruct it; it leaves the melody of its natural note to listen to the harmony of our voices and instruments; it applauds, it accompanies us, and repays the pleasure it receives with interest. The nightingale, more proud of its talent, seems willing to preserve it in all its purity; at least, it appears very little to value ours; and it is with the greatest difficulty

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it can be taught to repeat any of our airs. The canary can speak and whistle; the nightingale despises our words as well as our song, and never fails to return to the warbling of its own wild wood-notes. Its pipe is a master-piece of nature, which human art can neither alter nor improve; that of the canary-bird is a model of more pliant materials, which we can mould at pleasure. This last, therefore, contributes in a much greater degree to the comforts of society; it sings at all seasons; it cheers us in the dullest weather; and even adds to our happiness—for it amuses the young, and delights the recluse; it charms the tediousness of the cloister, and exhilarates the soul of the innocent and the captive."

"The breeding and rearing of these charming birds," says Bolton, "forms an amusement of the most pleasing kind, and affords a variety of scenes highly interesting to innocent minds. In this country, no less than in the old German Fatherland, and amid the green valleys of the Tyrol, many enthusiastic canary fanciers may be met with. There are societies in London—and some of them have existed for more than a century—for promoting the breed of canaries, and amateurs distinguish upward of thirty varieties: these varieties are separated into two great divisions—the *Plain* and the *Variegated;* the former being called *Gay Birds* or *Gay Spangles*, and the latter *Fancy Birds* or *Mealy Birds;* these latter are esteemed the strongest, and have the boldest song. *Jonks* or *Jonquils* is also a term applied to those of a pure yellow. There is also a variety called the *Lizard*, the plumage of which is of a greenish-bronze throughout, excepting the upper part of the head, which is covered by a patch of clear yellow, and this variety is looked upon as the nearest of kin to the original stock."

The American Goldfinch, *C. tristis*, is four and a half inches long; general color yellow; wings and tail black, varied with white; feeds on the seeds of the sunflower, lettuce, thistle, &c.; the nest is made on trees or tall bushes; eggs four to five, pure white, with reddish-brown spots at the smaller end. It is found from the tropics to the Fur Countries, and is a familiar bird at all seasons in the United States, and is often seen about the gardens. It has the various popular names of *Yellow-Bird*, *Thistle-Bird*, *Lettuce-Bird*, *Salad-Bird*, &c. Many are taken in trap-cages; their song is feeble, but plaintive and pleasing; in confinement they become familiar, and hence they are favorite cage birds.

The Pine-Finch, *C. pinus*, four and a half inches long; varied with olive-brown and black; beneath lighter shade; feeds on the seeds of the pine, birch, thistles, &c.; found from Florida to Maine; permanent in the Middle States.

Other species are the *C. Magellanicus*, found, though rarely, in Ohio; *C. psaltria*, found in Louisiana and Arkansas; *C. Mexicanus*, found in California; *C. Stanleyi*, also found in California.

The Citril-Finch—*Fringilla citrinella* of Linnæus—is five inches long, its plumage greenish-gray, tinged with ashy-gray, and blackish; found in Southern Europe, where it is a cage bird.

The Serin-Finch—*Loxia serinus* or *Fringilla serinus* of Linnæus; *Serin Vert* of the French—has often been confounded with the preceding; it is four and a half inches long; general color greenish-yellow; noted as a lively and indefatigable singer. It is migratory, and spends the summer in Middle Europe; some remain through the cold season.

The Glossy Finch—*F. nitens* of Linnæus—is four inches and a half long; plumage blue-black, or coal-black, with a gloss of steel; found in Cayenne.

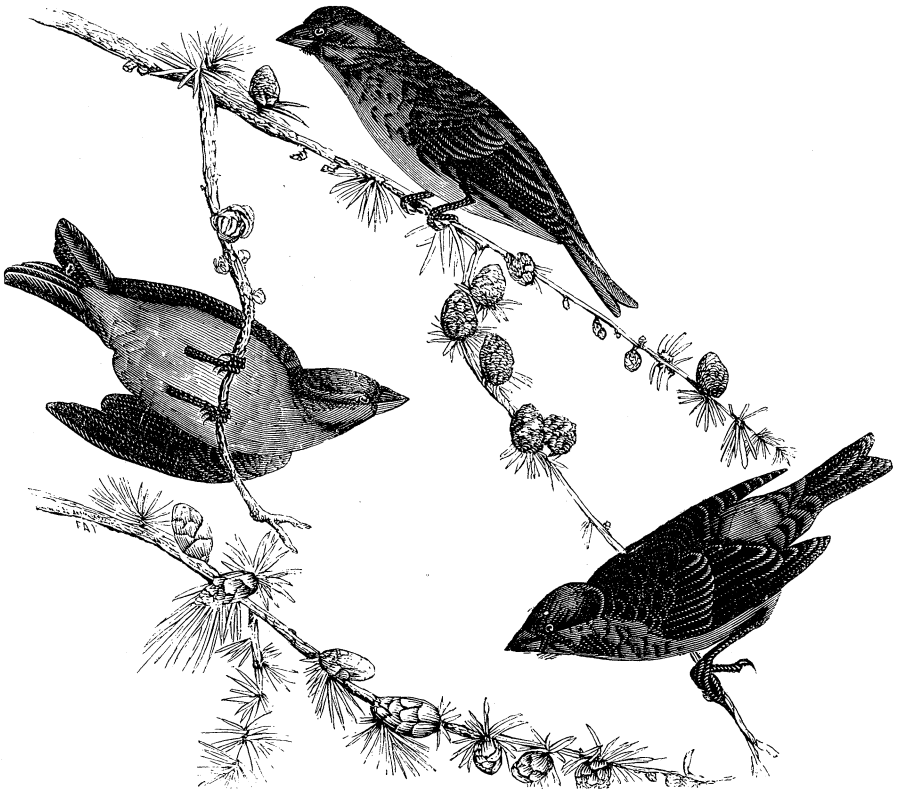
The Brazilian Finch—*F. granatina* of Linnæus—is four inches long; brown above, the rump blue; beneath chestnut-color; found in Brazil.

The Blue-bellied Finch—*F. Bengalensis* of Linnæus—is four and a half inches long; ashy-brown above; blue beneath; found in Guiana.

Other foreign species are the Liver-colored Finch, *F. hepatica*, of Western Africa; the Green Goldfinch, *F. melba*, of Brazil; and the Angola Finch, *F. Angolensis*, of Angola.

Genus ERYTHROSPIZA: *Erythrospiza.*—This includes the Purple Finch—the *American Linnet* of Nuttall—*E. purpurea;* it is six inches long; in full plumage, the male is rich crimson above, deepest on the head and neck; the back streaked with dusky; beneath white. This is a winter bird of passage, coming to us from the north in September and October, and in very severe seasons proceeding, in considerable numbers, as far as the Southern States, and even to

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THE PURPLE FINCH.

Mexico. Audubon often saw small flocks of them in Louisiana, from April to November. In May, it moves to the northern regions of the continent, though some linger by the way, and are often seen in New England and Northern New York throughout the summer, building their nests and carrying on their household affairs. This species has a habit of erecting the feathers of its crown like a crest; hence it is sometimes called the *Crested Purple Finch*. It feeds on the buds and berries of evergreens during winter and on insects in summer.

The American House-Finch, *Carpodacus familiaris* of Cassin, is six inches long; above brownish red; beneath white and brown; resembles the preceding; common in New Mexico; abundant and familiar in California, where it is called *Buriones*. Its song is exceedingly tender and melodious.

Other species are the *E. frontalis*, six and a quarter inches long; found in the Rocky Mountains, and *E. tephrocotis*, six inches long; found in the Northern Regions.

Genus AMMODROMUS: *Ammodromus*.—This includes the Swamp-Finch or Red Grass-Bird, *A. palustris*, five and a half inches long; bay above, beneath bluish-ash; it makes its nest on the ground; feeds on grass-seeds and aquatic insects; found from Texas to Labrador.

The Sea-side Finch, *A. maritimus*, is eight inches long; olive-brown above; gray beneath; feeds on marine crustacea and sea-shore insects. Found in maritime parts of New England and the Middle States.

The Quail-Head, *A. caudacutus*, is five inches long; olive above; soiled white beneath; the head, when the bird is seen on the ground, resembles that of the quail; it is found in salt marshes, where it breeds, as also the preceding.

The Western Swamp-Sparrow, or Brown-headed Finch, *A. ruficeps*, is six inches long; chestnut-brown above, beneath pale-ashy; found in California.

Other species are *A. Macgillivrayi*, five and a half inches long; found in Texas: *A. Bachmani*, six inches long; found in the Carolinas: and *A. Lecontii*, five inches long; found in Missouri: *A. Lincolnii*, five and three-quarters inches long, found from New York to Labrador.

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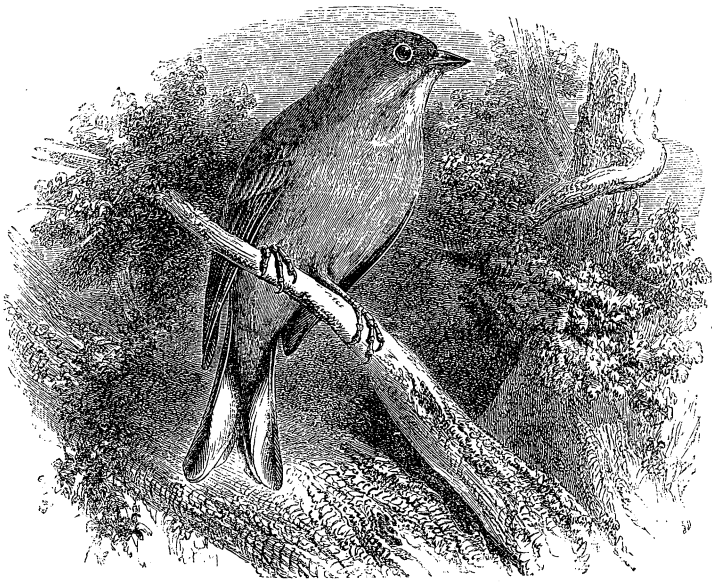
The LONG-TAILED SWAMP-SPARROW, *A. rostratus* of Cassin, is six inches long; dull brown above, beneath dull white; found in California.

Genus SPIZA: *Spiza.*—This includes the INDIGO-BIRD, *S. cyanea*, five and a half inches long; blue, with greenish tints; one of our most beautiful summer visitors; feeds on caterpillars, worms, grasshoppers, and seeds; the nest is usually on a low bush; the eggs four to five, white. It breeds in the United States; returns to Mexico and South America in winter.

Other species are the PAINTED BUNTING, *S. ciris*, five inches long; colors purplish-blue and yellowish-green; found in the Southern States, and the LAZULI FINCH, *S. amœna*, five and a half inches long; blue above and white beneath; found on the Columbia River.

THE EMBERIZINÆ OR BUNTINGS.

These have a conical, acute bill; wings of moderate size; the hind toe larger than the inner one, and the claws slender. They are generally distributed in both hemispheres; feed more on the ground than the Fringillinæ, and build their nests in low bushes or tufts of grass. Like the finches, they collect in large flocks in the winter, and frequent the open fields. Their food consists of seeds and insects.



THE ORTOLAN OR GREEN-HEADED BUNTING.

Genus EMBERIZA: *Emberiza.*—This includes the ORTOLAN or GREEN-HEADED BUNTING—*Bruant Ortolan* of the French—*E. hortulana*, six and a quarter inches long; reddish-brown above; beneath reddish-buff; frequents light sandy soils; builds on the ground, and lays five to six eggs. It is migratory, and breeds in the north of Europe; in moving southward, about August, great numbers are taken in England, France, Germany, &c., in nets, and fattened for the table, they being esteemed a great luxury. To hasten this process, they are shut up in a room artificially lighted, so as to offer no distinction between night and day, and fed with oats, millet, and bread, mixed with spice. Booth says: "These birds are fed up till they become lumps of fat of three ounces in weight, some of which are potted or otherwise preserved, and exported to other countries." The ortolan is kept in cages on account of its handsome appearance and pleasing song.

The YELLOW HAMMER of Europe—properly *Yellow Ammer*, the latter word signifying *bunting* in the German—*E. citrinella*, is a handsome bird, seven inches long; head, neck, and cheeks lemon-yellow; back and wings reddish-brown, tinged with yellow; under surface of the body bright lemon-yellow; common throughout Europe, from the Mediterranean to Norway; in Eng-

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land it unites in winter with flocks of chaffinches and green-finches, and feeds on grain-seeds and insects. It is a pleasing singer, though its notes are few and repeated five or six times in quick succession. In Italy great quantities are caught, with the ortolan bunting, for the table.



THE CIRL BUNTING.

The BLACK-HEADED BUNTING or REED-BUNTING, *E. schœniculus*, is six inches long; above black; beneath white, streaked and clouded with brown; common throughout Europe; a summer visitor to the north.

The CIRL BUNTING, *E. cirlus*—the *Bruant Zizi* of the French—is five and a half inches long, with chestnut, black and yellow above, dull yellow beneath; common in the south of Europe; migrates to the north in summer.

Other foreign species of Bunting are as follows: the MOUNTAIN-BUNTING, *E. montana*, six inches long; ash-colored, spotted with black, above; the breast rusty-red; is a rather rare species; inhabits northern Europe; migrates southwardly in mid-winter. The COMMON or CORN-BUNTING of Europe, *E. miliaria*, is seven and a half inches long; reddish-gray above; yellowish-white below; inhabits Europe and Northern Asia; is sedentary in Germany. The FOOLISH BUNTING—*Bruant Fou* of the French—*E. cia*, is six inches long; brownish-red, spotted with black, above; rust-color below; it is fond of solitude, and easily caught in traps, whence its name; inhabits Southern Europe. The SPARROW-BUNTING, *E. passerina* of Bechstein, is five inches long; red, olive, and black above; greenish-white, spotted with brown, beneath; a bird of passage, inhabiting the mountains of Europe in summer.

Among the American buntings, some of which pass among us in popular language for sparrows, there are none of particular celebrity. They are all migratory, and feed on seeds, sometimes on insects; they live in pairs, often moving in small flocks.

The BLACK-THROATED BUNTING, *E. Americana*, is six and a half inches long; back grayish-brown, with longitudinal streaks; beneath yellow and white. In its flight and notes it closely resembles the corn-bunting of Europe; the nest is neatly made of grass, usually beneath a tuft of herbage, and partly imbedded in the soil; the eggs are five or six, dull white, blotched with umber. It is migratory, breeding in summer throughout the United States, but most abundantly at the South.

TOWNSEND'S BUNTING, *E. Townsendii*, is five and a half inches long; bluish-gray, marked with black, above; below grayish-white; migratory; found in Pennsylvania and the Rocky Mountains. The LARK-BUNTING, *E. grammaca*, is six and a half inches long; light grayish-brown above; below yellowish-white; migratory; found on the upper Missouri and eastern declivities of the Rocky Mountains. The SAVANNAH BUNTING—*Fringilla savanna* of Wilson—*E. savanna*, is a very abundant species, resembling the sparrows, and in winter associating with the field-sparrow and bay-winged sparrow. It confines itself principally to the ground, where it runs with great agility, lowering its body as if to evade your view, and when in danger, hiding as closely as a mouse; it seldom takes wing unless much alarmed or suddenly surprised. In winter, however, it comes familiarly and fearlessly about the house and garden, sitting on fences and low buildings. It is five and a half inches long; reddish-brown, spotted, above; lower parts white. Its nest is made on the ground, at the foot of a bush or tuft of grass; the eggs are four to six; there are usually two broods in a season. This bird has a few notes, frequently uttered, but no song; it is common throughout the United States; very abundant in the South in

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winter. The CLAY-COLORED BUNTING, *E. pallida*, is five inches long; light yellowish-brown above; beneath grayish-white; found on the Rocky Mountains. The YELLOW-WINGED BUNTING—the *Yellow-winged Sparrow* of Wilson—*E. passerina*, five inches long; light grayish-brown above; beneath yellowish-gray; migratory; found from Texas to New England. HENSLOW'S BUNTING, *E. Henslowi*, is five inches long; pale brown above; yellowish-gray beneath; found throughout the United States; winters in the Southern States. The FIELD-BUNTING—the *Field-Sparrow* of Wilson—*E. pusilla*, is six inches long; above chestnut and blackish-brown; beneath grayish-white; abundant in summer from Texas to Maine. The TREE-SPARROW or CANADA BUNTING, *E. Canadensis*, is six and a quarter inches long; above brown, bay, and yellow; beneath cream color. This is a northern bird, but migrates to the south in winter; it breeds as far south as Maine. It frequents trees, where it hops and dances and sings, and sweetly too, often mixing with the *White-throated Finch*. In severe weather it is often seen in the elm-trees of Boston; its migrations are not farther south than Pennsylvania. This bird, which passes for a sparrow, is one of the commonest of its genus in New England. The BLACK-THROATED FINCH, *E. bilineata* of Cassin, is five inches long; ashy-brown, with olive, above; under parts white, tinged with ashy and olive; found in Texas and New Mexico.

Genus PLECTROPHANES: *Plectrophanes.*—These birds are sometimes called *Lark-Buntings:* the most noted species is the LAPLAND SNOW-BUNTING—*Lapland Song-Sparrow* of Nuttall; *Lapland Lark-Bunting* of Selby—*P. Lapponicus*, six and a half inches long; summer plumage, head, chin, and breast black; beneath white: the winter plumage is, upper part of the head black, edged with rufous; neck black, the feathers tipped with white. This is an arctic bird, common to Europe and America; in the depth of winter it moves southward as far as England on the other side of the Atlantic, and as far as Pennsylvania on this. It is often seen in very severe seasons in New England, feeding upon the seeds on exposed pieces of ground, that have been swept clear of snow by the wind. It is found usually in small numbers, sometimes mixed with the roving snow-birds; at other times it visits us in large flocks. It feeds on seeds, berries, grass, leaves, buds, and insects; the nest is placed on the ground; the eggs are five to seven. Sometimes immense flocks of these birds are seen in Central Europe in the fall and winter, mingled with larks.

The WHITE SNOW-BIRD—sometimes called the *White Bird*—*P. nivalis*, is seven and a half inches long; the colors vary in different species; the common colors are brown, striped with black, above; beneath white. It is to be distinguished from the Common Snow-Bird—*Struthus hyemalis*—though like that it is most abundant in the northern regions of both continents. It usually appears in New England and the Middle States after a severe snow-storm. It has been known in a few cases to breed in Maine and Massachusetts. Its nest is placed on the ground; the eggs four to five; the food grass-seeds, insects, and minute shells.

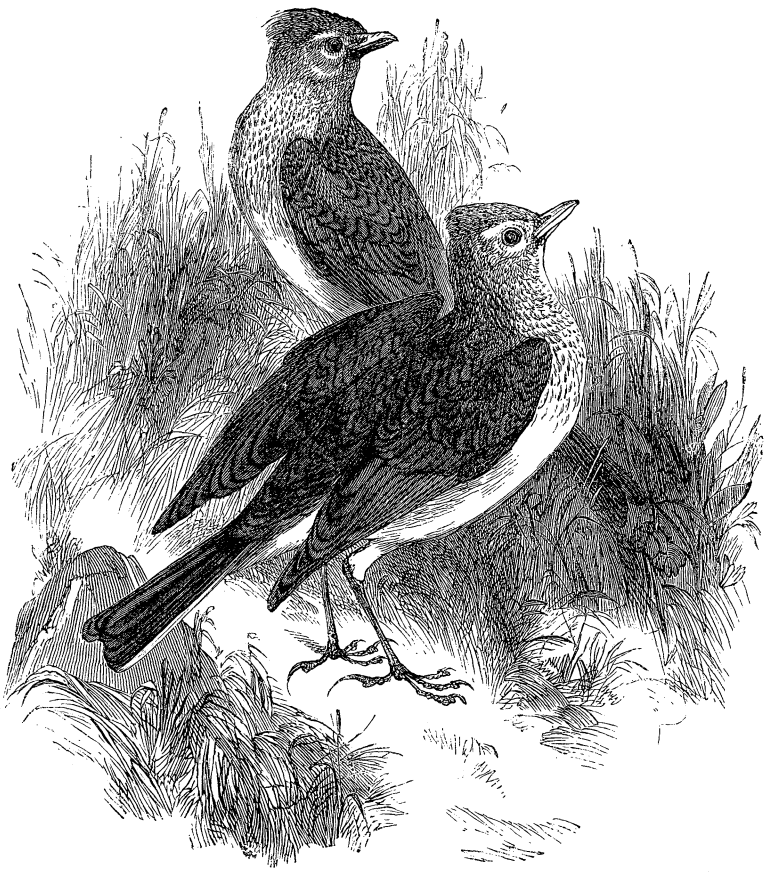
Other species are the *P. pictus*, length six inches; found in the northern regions of North America; *P. ornatus*, found on the prairies of the Platte River; MCCOWN'S BUNTING, *P. McCownii*, six inches long; found in Texas, New Mexico and California; and *P. Smithii*, six inches long; found in Illinois.

THE ALAUDINÆ OR LARKS.

This group includes several interesting birds, mostly of the eastern hemisphere. They are peculiarly birds of the fields, meadows, and open places, and are distinguished by their vigilance and their musical powers. They build on the ground, usually produce two broods in a season, are generally birds of passage, and in Europe immense numbers are caught for the table in their migrations.

Genus ALAUDA: *Alauda.*—This includes the SKY-LARK or FIELD-LARK—*Alouette* of the French; *Lodola* of the Italians; *Feld-Lerche* of the Germans—the most celebrated song-bird of England, and after the nightingale, the most celebrated of Europe, generally. It is seven inches long, the tail being three inches; it is in size about equal to the boblink. The forehead and poll are rusty-yellow, spotted with blackish-brown; when the bird is excited the feathers of the crown erect themselves into a crest. The back is brown, blackish-brown, and gray; the lower parts dingy white. The female, as in most of the passerine birds, is a trifle smaller than the male.

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SKY-LARKS.

Black and white varieties are sometimes seen. The nest is placed on the ground, and often under the shelter of a tuft of grass; the eggs are four or five, and whitish-gray. The poet says:

> "The daisied lea he loves, where tufts of grass
> Luxuriant crown the ridge; there, with his mate,
> He founds his lowly house, of withered bents
> And coarsest spear-grass; next, the inner work
> With finer and still finer fibers lays,
> Rounding its corners with his speckled breast."

This species feeds on insects, larvæ, ants' eggs, and various kinds of small seeds. Its flesh ranks among the greatest of delicacies; traps and nets of many kinds are employed for its capture. It is sedentary in Middle and Southern Europe, and begins its song early in the spring, and continues it till late in the autumn, generally singing while rising or falling perpendicularly in the air, although its joyous notes are occasionally poured forth while sitting on the ground. So powerful is the voice lodged in this little body, that its sound may be heard long after the songster is quite out of sight; and even then a practiced ear can distinguish those peculiarities in the song which mark whether the bird is still rising, or stationary, or gradually descending. The Lark sings for about eight months in the year, and as his notes are remarkable for their power and vivacity, he is a great favorite as a cage-bird. In the summer his lay commences before three o'clock in the morning, and continues till after sunset. He is also very long-lived; Yarrell mentions an instance of one of these birds living in a cage for nineteen years and a half.

Mudie notices a correspondence between the movements of the lark, when it climbs up to the sky by its winding flight, and its notes, as follows: "When the volutions of the spiral are narrow,

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and the bird changes its attitude rapidly in proportion to the whole quantity of flight, the song is partially suppressed, and it swells as the spiral widens, and sinks as it contracts; so that, though the notes may be the same, it is only when the lark sings poised at the same height that it sings in a uniform key. It gives a swelling song as it ascends, and a sinking one as it comes down; and even if it take but one wheel in the air, as that wheel always includes an ascent or a descent, it varies the pitch of the song.

"The song of the lark, besides being a most accessible and delightful subject for common observation, is a very curious one for the physiologist. Every one in the least conversant with the structure of birds must be aware that, with them, the organs of intonation and modulation are *inward*, deriving little assistance from the tongue, and none, or next to none, from the mandibles of the bill. The windpipe is the musical organ, and is often very curiously formed. Birds require that organ less for breathing than other animals having a windpipe and lungs, because of the air-cells and breathing-tubes with which all parts of their bodies—even their bones—are furnished. But those diffused breathing-organs must act with least freedom when the bird is making the greatest efforts in motion—that is, when ascending or descending; and in proportion as they cease to act, the trachea is the more required for the purposes of breathing. The sky-lark thus converts the atmosphere into a musical instrument of many stops, and so produces an exceedingly wild and varied song—a song which is perhaps not equal, either in power or compass, in the single stave, to that of many of the warblers, but one which is more varied in the whole succession. All birds that sing ascending or descending have similar power, but the sky-lark has it in a degree superior to every other."

Main says: "No bird sings with more method: there is an overture performed, *vivace crescendo*, while the singer ascends; when at the full height, the song becomes *moderato*, and distinctly divided into short passages, each repeated three or four times over, like a *fantasia*, in the same key and tune. If there be any wind, he rises perpendicularly by bounds, and afterward poises himself with breast opposed to it. If calm, he ascends in spiral circles; in horizontal circles during the principal part of his song, and zigzagly downward during the performance of the *finale*. Sometimes, after descending about half way, he ceases to sing, and drops with the velocity of an arrow to the ground. Those acquainted with the song of the sky-lark can tell, without looking at them, whether the birds be ascending or stationary in the air, or on their descent, so different is the style of the song in each case. In the first, there is an expression of ardent impatience; in the second, an *andante* composure, in which rests of a bar at a time frequently occur; and in the last, a graduated sinking of the strains, often touching the subdominant before the final close. The time and number of the notes often correspond with the vibration of the wings; and though they sometimes sing while on the ground, as they are seen to do in cages, their whole frame seems to be agitated by their musical efforts."

The strong attachment of this species to their young has been the subject of remark by many naturalists: Mr. Blyth records that "some mowers actually shaved off the upper part of a nest of the sky-lark without injuring the female which was sitting on her young; still she did not fly away, and the mowers levelled the grass all around her without her taking further notice of their proceedings. A young friend of mine, son of the owner of the crop, witnessed this, and about an hour afterward went to see if she was safe, when, to his great surprise, he found that she had actually constructed a dome of dry grass over the nest during the interval, leaving an aperture on one side for ingress and egress, thus endeavoring to secure a continuance of the shelter previously supplied by the long grass."

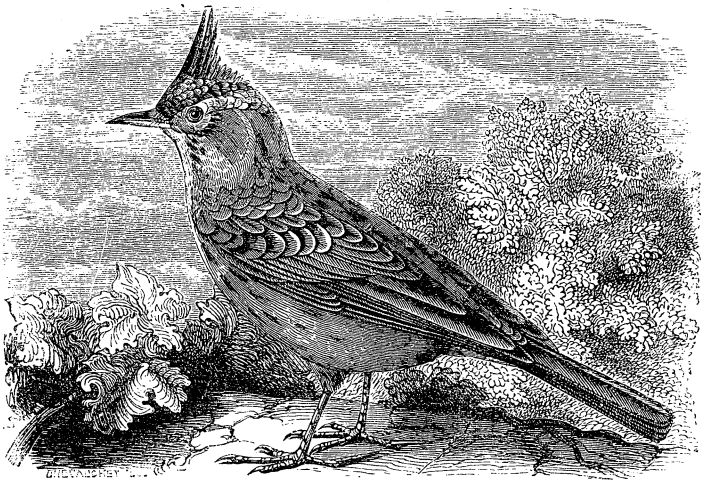
To no bird, perhaps not even the nightingale, have the English poets paid such frequent homage as to the sky-lark; from Chaucer downward, there is scarcely one of them who has not repaid the ecstatic music of that "bard of the blushing dawn"—the "herald of the morn," as Shakspeare hath it—with a strain as full of gladness and melody; and not from the poets only has it received these tributes of admiration: grave divines, such as Jeremy Taylor and Bishop Hall, have made it the theme of their high discourse; the former says that "it did rise and sing as if it had learned music and motion from an angel." Wordsworth's lines, though often quoted, are so descriptive, and yet so poetical, that we cannot omit them:

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"Ethereal minstrel! pilgrim of the sky!
Dost thou despise the earth, where cares abound?
Or, while thy wings aspire, are heart and eye
Both with thy nest, upon the dewy ground?
Thy nest, which thou canst drop into at will,
Those quivering wings composed, that music still.

"To the last point of vision, and beyond,
Mount, daring warbler! That love-prompted strain—
'Twixt thee and thine a never-failing bond—
Thrills not the less the bosom of the plain!
Yet might'st thou seem, proud privilege, to sing
All independent of the leafy spring.

"Leave to the nightingale the shady wood—
A privacy of glorious light is thine,
Whence thou dost pour upon the world a flood
Of harmony with rapture more divine.
Type of the wise, who soar—but never roam,
True to the kindred points of heaven and home."



THE CRESTED LARK.

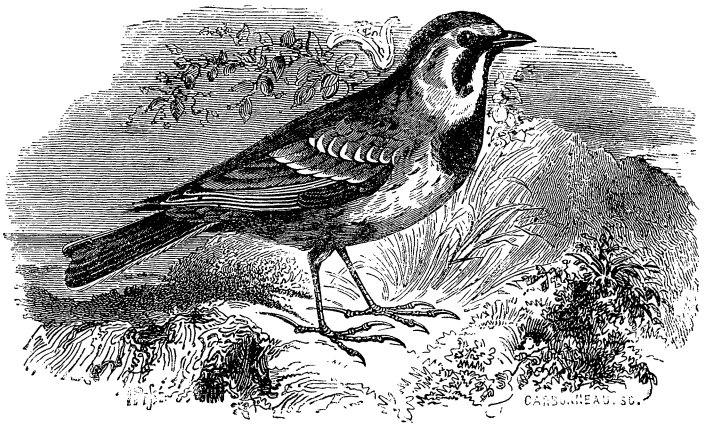
The CRESTED LARK—*Alouette Cochevis* of the French—*A. cristata*, is six and three-quarter inches long; brown above and pale yellow beneath. The crest of a few elongated feathers pointing backward, is reddish-brown. It visits Northern Europe in summer, is sedentary in Southern Europe, and is common in Northern Africa. It feeds on worms and grain, and may be often seen on the roads near Paris picking among the manure, and flying at the approach of a traveler.

The WOOD-LARK—*Alouette lulu* of the French—*A. arborea*, has a slight crest, is over six inches long, wood-brown above, pale yellowish-brown beneath. Its song is greatly admired, and is often poured forth at evening, as if in rivalry of the nightingale.

"What time the timorous hare trips forth to feed,
When the scared owl skims round the grassy mead,
Then high in air, and poised upon its wings,
Unseen the soft-enamored wood-lark sings."

Blyth says: "In hot summer nights wood-larks soar to a prodigious height, and hang singing in the air." Bechstein says: "The wood-lark not only excels all other larks in the beauty of its song, but, in my opinion, surpasses in this respect all German birds whatever, except the chaffinch and the nightingale. Its tones are flute-like, and the varying phrases of its song have all a melancholy and tender expression. It sings either perched on the top of a tree, or flies upward almost beyond the reach of sight, and remains poised on its outstretched wings, often warbling for an hour together. In confinement it always sings on its perch."

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THE SHORE-LARK.

The SHORT-TOED LARK, *A. brachydactyla*, is a small species, five inches long, of a sandy-brown above, beneath whitish; common in Southern Europe. The SHORE-LARK, *A. alpestris*, is six inches long, and found in the north of Europe and Asia. Specimens have been occasionally met with as far south as France and England.

The HORNED LARK, *A. cornuta*, is an American bird, until lately confounded with the preceding; it is seven inches long; the male has an erectile crest; color, dusky brown above; breast reddish-brown; the nest placed on the ground; the eggs olive-white. This is a beautiful species, and one of our winter birds of passage, arriving from the north in the fall, usually staying with us the whole winter, frequenting sandy plains and open downs, and is numerous in the Southern States, as far as Georgia, during that season. They fly high, in loose, scattered flocks, and at these times have a single cry, like the sky-lark. They are very numerous in many tracts of New Jersey, and are frequently brought to Philadelphia market. They are then generally very fat, and are considered excellent eating. Their food seems principally to consist of small, round, compressed black seeds, buckwheat, oats, &c., with a large proportion of gravel. They are said to have a pleasing song.

Other American species are the BROWN LARK, *A. rufa*, six inches long; brown-olive above; brownish-ochre beneath; habits similar to the preceding; the *A. minor*, found in Texas; and the *A. Spraguei*, found on the upper Missouri.



THE BULL-FINCH.

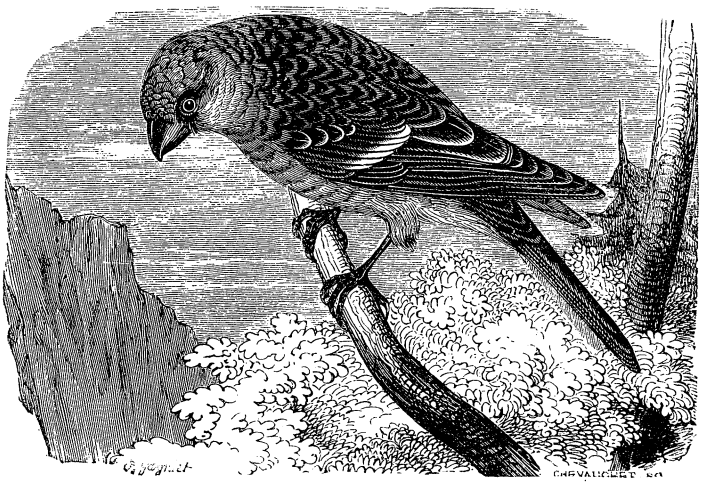
THE PYRRHULINÆ OR BULL-FINCHES.

These birds greatly resemble the grosbeaks in some respects, and especially in the size and

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form of the heads and bills; they occur in both hemispheres, principally in temperate countries, and feed upon seeds, the hardest shells of which are seldom able to resist the force of their firm, strong bills.

Genus PYRRHULA: *Pyrrhula.*—The COMMON BULL-FINCH of Europe—*Bouvreuil* of the French; *Gimpel* of the Germans—*P. Vulgaris* is seven inches long; the top of the head and the under part of the chin a velvety black; the throat, back, and shoulders gray; the rump white; the breast crimson; the lower parts white. There are *white*, *black*, and *speckled* varieties; hybrids with canaries are often produced. It is a robust and clumsy-looking bird; conceals its nest in furze or hedges; lays from two to six bluish-white eggs; feeds on seeds of ash, maple, beech, and furze; also on the seeds of weeds and grasses, and on the buds of trees, thus often doing great damage. On account of this habit it is called *Pick-a-bud* in England, where it is also called *Coal-hood*, *Red-hoop*, *Tony-hoop*, *Alp*, *Pope*, *Nope*, &c. In confinement it is a docile bird, and though its natural note is harsh as the creaking of a door or wheelbarrow, it may be trained to whistle many airs in a soft, pure, and flute-like tone. It is very common in England, and we see it often referred to in English books · it is found throughout Europe at all seasons.

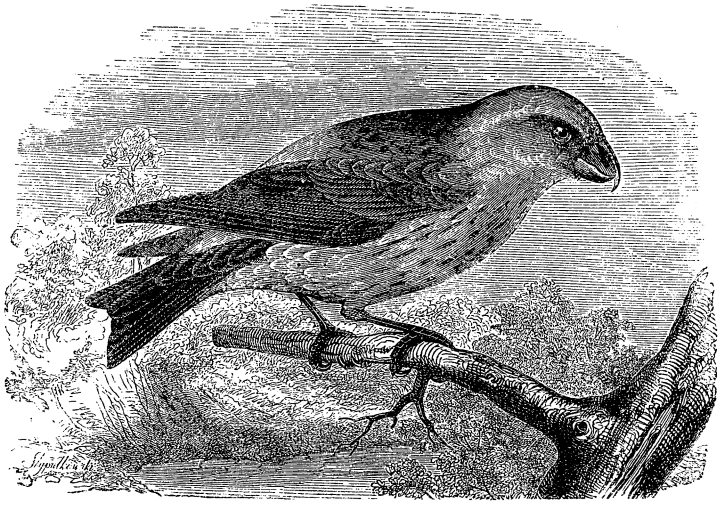


THE PINE-GROSBEAK.

The PINE BULL-FINCH or PINE GROSBEAK—the *Bouvreuil Duc-bec* of the French; *P. enucleator* of Yarrell; the *Corythus enucleator* of Audubon and De Kay—is eight and a half inches long; general colors bright carmine, with a vermilion tinge; that of the female yellowish-brown above; beneath ash-gray. It is found in the northern parts of both continents. It resembles the bull-finches in its form, and the cross-bills in some of its habits. It feeds on the seeds and buds of various kinds of trees; builds a nest of sticks on the branch of a tree, lining it with feathers; the eggs are four or five. It breeds in this country from Maine northward; in severe seasons it comes southward in small flocks, sometimes abundantly as far as Massachusetts, and more rarely as far as Pennsylvania. The appearance of a flock of these birds, the males with their splendid red attire, and the females with their more sober but still beautiful plumage, is quite striking. They are excellent food. The male has a pleasing song, and in confinement will often sing at night.

Genus LOXIA: *Loxia.*—To this belong the COMMON EUROPEAN CROSS-BILL—*Bec croisé* of the French—*L. curvirostra*, which has a strong bill, the mandibles of which are crescent-shaped, and cross each other at the points. It inhabits the northern regions of Europe, and lives principally in the forests of fir; it feeds on pine-cones, and also on the seeds and nuts of other trees, its bill enabling it to break the shells of these with facility. It is nearly seven inches long, and is subject to great changes of color, the males of a year old being red, and those that are older of a greenish-yellow, spotted with white, and having a grayish tinge over the whole plumage. These birds move southward in winter, and are periodically seen in considerable flocks in England.

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THE PARROT CROSS-BILL.

The AMERICAN CROSS-BILL, *L. Americana*, resembles the preceding, and has generally been considered identical with it; there is no doubt, however, that it is distinct. It is seven inches long; the male is red, passing into whitish beneath. It feeds on the seeds and buds of trees, and is a northern bird, but breeds in a few instances as far south as Pennsylvania.

Other species are as follows: the PARROT CROSS-BILL, *L. pityopsittacus*, seven inches and a half long; general color tile-red, with dusky streaks below. It is somewhat larger than the common cross-bill, but resembles it in its habits. It is occasionally seen in England and France. The EUROPEAN WHITE-WINGED CROSS-BILL, *L. bifasciata*, is six and a quarter inches long; brick-red, orange, and grayish-brown above; reddish-orange beneath; a rare species.

The AMERICAN WHITE-WINGED CROSS-BILL, *L. leucoptera*, is generally of a crimson-red, with wings and tail black, the former having two white bands; length six inches. It is a northern species, rarely moving farther south than Northern New York. This has been long deemed identical with the preceding, but it is no doubt a distinct species.

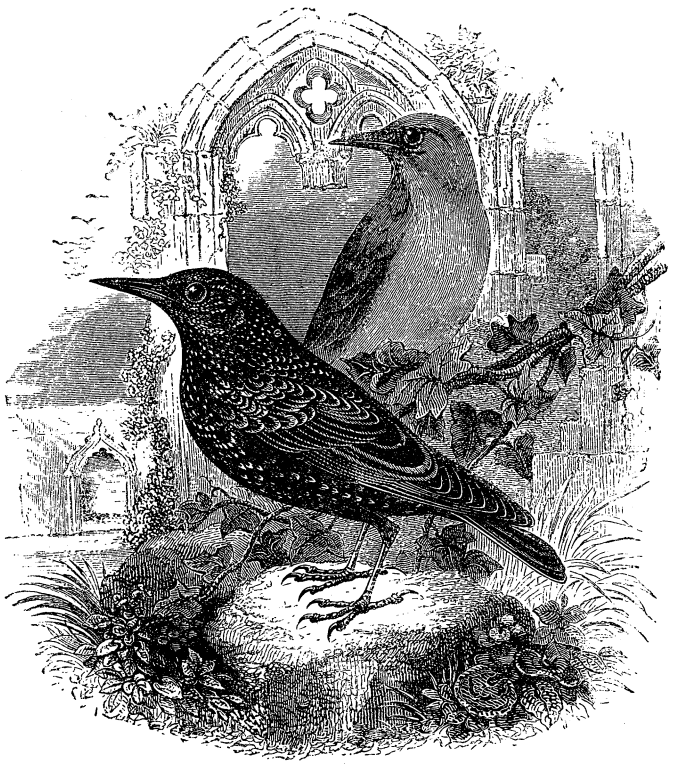
THE PHYTOTOMINÆ OR PLANT-CUTTERS.



THE CHILIAN PLANT-CUTTER, *P. rara*.

These birds are distinguished by having the margins of their mandibles finely serrated; the bill is short, conical, and stout, as in the bull-finches. They are found only in the temperate regions of South America; the typical species, *Phytotoma rara*, is a native of Chili. They frequent the wooded parts of the country, and feed upon buds, fruits, and herbage, which they cut away with their bills, and thus often do great damage when they visit the cultivated grounds. The amount of the injury is greatly increased by the circumstance that the birds mischievously cut off quantities of buds, fruits, &c., for the mere pleasure of throwing them down; and for this reason the peasants wage a constant war with them, which, according to Molina, at the time he wrote, was rapidly diminishing their numbers. They also occasionally feed on insects. Their cry, consisting of *rara, rara, rara*, is said to be exceedingly disagreeable, resembling the noise made by grating the teeth of two saws together.

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THE EUROPEAN STARLING OR STARE.

THE STURNIDÆ.

This family includes several remarkable groups, as the *Bower-Birds*, *Grackles*, *Beef-Eaters*, *Tree-Starlings*, *Pastors*, *Meadow-Larks*, *Crow-Blackbird*, *Baltimore* and *Orchard Orioles*, *Cow-Blackbird*, *Red-Wing Starling*, &c. In their general characteristics we may include an elongated and compressed bill, wings long and more or less pointed, the toes long and strong, especially the hind one; they feed on insects, worms, fruits, and seeds; they are generally gregarious; are docile and tractable in captivity, and exhibit some of the peculiar sagacity of the crows.

THE PTILONORHYNCHINÆ, OR BOWER-BIRDS, OR GLOSSY STARLINGS.

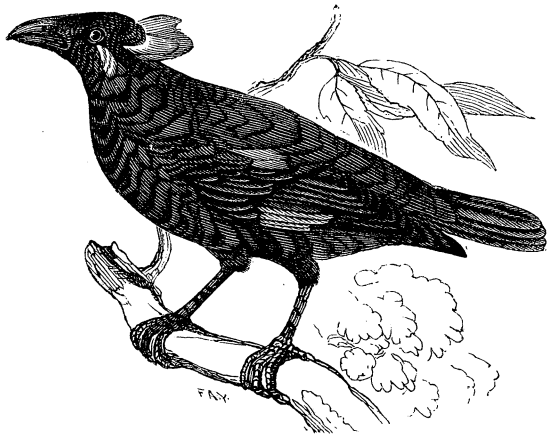
These birds are peculiar to the eastern hemisphere. The majority, including the *Choucaries* and *Pirolles*, are found in India, Australia, and the intervening islands, but Africa also possesses a few species belonging to the genus *Juida*. They inhabit the hot regions of that continent, where they fly in large flocks, feeding principally on fruits, and often attacking the gardens and vineyards, to which they do great damage. They also devour insects and worms, and are sometimes seen perched on the backs of cattle, searching for the parasitic insects among the hair. They are generally showy birds, with a metallic luster upon their plumage, are rather larger, than the common starling, and have a much longer tail. They nestle in rocks and holes of trees, and lay five or six eggs.

The *Bower-Birds* of Australia belong to the genera *Ptilonorhynchus* and *Chlamydera*. These are remarkable for the habit of making a sort of bower, which has nothing to do with their nidification, but merely serves as a sort of playing-ground, in and around which they assemble for amusement! They inhabit the forests, and the bower is placed under the shelter of some large tree. Mr. Gould describes the construction and use of that of the Satin Bower-Bird, *P. holosericeus*—*Kitta holosericeus* of Timminck, the *Kitte Velouté* of the French—in the following words: "The base consists of an extensive and rather convex platform of sticks firmly interwoven,

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on the center of which the bower itself is built; this, like the platform on which it is placed and with which it is interwoven, is formed of sticks and twigs, but of a more slender and flexible description, the tips of the twigs being so arranged as to curve inward and nearly meet at the top; in the interior of the bower the materials are so placed that the forks of the twigs are always presented outward, by which arrangement not the slightest obstruction is offered to the passage of the birds. For what purpose these curious bowers are made is not yet, perhaps, fully understood; they are certainly not used as a nest, but as a place of resort for many individuals of both sexes, which, when there assembled, run through and around the bower in a sportive and playful manner, and that so frequently that it is seldom entirely deserted."

A still more extraordinary structure of the same description is formed by the Spotted Bower-Bird, *Chlamydera maculata*, an inhabitant of the interior of Australia; it is thus described by Mr. Gould. The bowers "are considerably longer and more avenue-like than those of the satin bower-bird, being in many instances three feet in length. They are outwardly built of twigs, and beautifully lined with tall grasses, so disposed that their heads nearly meet; the decorations are very profuse, and consist of bivalve shells, crania of small mammalia, and other bones. Evident and beautiful instances of design are manifest throughout the bower and decorations formed by this species, particularly in the manner in which the stones are placed within the bower, apparently to keep the grasses with which it is lined fixed firmly in their places; these stones diverge from the mouth of the run on each side, so as to form little paths, while the immense collection of decorative materials, bones, shells, &c., are placed in a heap before the entrance of the avenue, this arrangement being the same at both ends." Mr. Gould adds, in evidence of the labor that must be bestowed by the birds upon the construction of these apparently useless assembly rooms, that he frequently found them at a distance from any river, so that the shells and small stones employed in their fabrication must have been transported from a considerable distance. It appears also that the birds collect no other bones than those which have been bleached in the sun; and as it is certain that as they feed almost entirely upon fruits and seeds, these remains of other animals cannot be regarded as relics of their victims.



THE MINO-BIRD.

THE GRACKLES.*

The birds of this group are found in India and the Indian Isles, where they inhabit the jungles.

Genus GRACULA: *Gracula.*—To this belongs the Mino-Bird, *G. religiosa—Eulabes Javanus* of Viellot; *Mainatus Sumatranus* of Lesson, and *Minor Grackle* of Bechstein; this is twelve inches long; the color is a deep velvety-black; a white space in the middle of the wing; bill and feet yellow; behind the eye spring fleshy caruncles of a bright orange-color, and extend beyond

* The genus *Grackle*, as now restricted by most naturalists, includes only the present group. Cuvier's genus of this name included many others.

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the occiput. It is found in Java, Sumatra, and the great Eastern Islands. Insects and fruits form its food; it is easily tamed, and learns to whistle and talk with facility. It is fond of cherries and grapes. If a cherry be brought and shown to it, and not given to it immediately, it will cry like a child. It will also sing and chatter like a parrot. With the natives it is a special favorite; it is sent to China in great numbers; it is also sometimes brought to Europe and America, and is kept as a pet in cages. Marsden says that it has the faculty of imitating human speech in greater perfection than any other of the feathered tribe: Bontius tells the following story: there was, when he was in Batavia, an old Javanese woman, the servant of a Chinese gardener, who kept one of these birds, which was very loquacious. Bontius was very anxious to buy it, but this the old woman would not listen to. He then begged that she would at least lend it to him that its picture might be taken, a request which was at last granted with no very good grace, the ancient Mohammedan dame being under great apprehension that Bontius would offer the abomination pork to her beloved bird. This he promised not to do, and had the loan of the Mino, which kept continually saying, "*Orang Nasarani Catjor Macan Babi.*" This, being interpreted, means, "Christian Dog, Eater of Pork;" and Bontius came to the conclusion that the unwillingness of the old woman arose not only from the fear of her bird being desecrated by an offer of swine's flesh, but also from the apprehension that he or his servants, irritated by its contumelies, would wring its neck. M. Lesson gives an account of one he saw at Java which knew whole phrases of the Malay language. The Javanese call this bird *Mëo* and *Mancho;* another species *Eulabes Indicus*, is said to exist, of the size of the European blackbird.

THE BUPHAGINÆ OR OX-PECKERS.

This group includes only a few species of birds, inhabiting the warmer parts of Africa, and belonging to the genus BUPHAGO. The best known is that of the COMMON OX-PECKER or BEEF-EATER, so called from its habit of perching on the backs of cattle, and extracting the larvæ of the bot-flies, by which those quadrupeds are commonly infested. The French call it *Pique Boeuf;* the scientific name is *B. Africana.* Singular as the diet we have mentioned may seem, it is said to constitute the principal nourishment of these birds, and the bill is certainly peculiarly adapted for gently squeezing the parasites out of the tumors caused by their presence. The cattle are said to allow the birds to perch upon them without any signs of unwillingness, which is indeed the case in respect to several other species which devour the insects found there. The Common Ox-Pecker is a small bird, about eight or nine inches in length; its plumage is reddish-brown above and yellowish-white beneath; the legs are brown and the bill yellowish, with the tips of both mandibles red. It is generally seen associated in small flocks of seven or eight individuals, and is exceedingly shy.

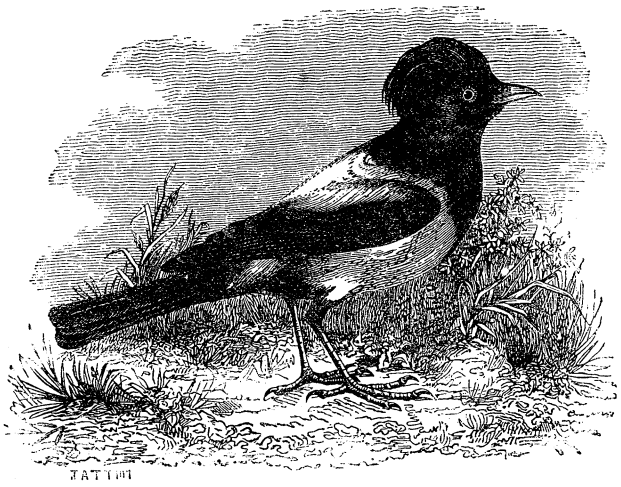
THE STURNINÆ OR TRUE STARLINGS.

The True Starlings are for the most part inhabitants of the eastern hemisphere, only the genus *Sturnella* belonging to America. In these the bill is usually elongated, rather slender, and tapering, the wings and tail rather short, the toes long and stout, and furnished with acute claws.

Genus STURNUS: *Sturnus.*—This includes the COMMON STARE or STARLING of Europe, *S. vulgaris*—*Etourneau* of the French—a well-known, handsome, sprightly bird, often tamed, and as it can be taught to whistle tunes and articulate a few words, it is a favorite pet. It nestles in holes of rocks and buildings, and in hollow trees; the nest is composed of twigs, straws, grass, and roots; the eggs are four, of a pale blue tint. It is eight and a half inches long, of a black color, with violet and green reflections, and spotted with buff. After breeding time, the starlings assemble, often in immense flocks, and roost among the reeds in fenny districts, sometimes crushing them down by their weight, like grass after a storm. They are common in Europe, and we often see them mentioned as familiar birds in English books. They are stationary, except that in severe winters they move for a short distance southward. They have particular haunts, where they assemble in vast multitudes. From October to March, many thousands of them roost in a mass of thorn-trees in the Zoological Gardens of Dublin.

Genus PASTOR: *Pastor.*—This includes the ROSE-COLORED PASTOR—*Martin Roselin* of the French—*P. roseus*, resembling the starlings, and, like them, found living in the vicinity of cattle and

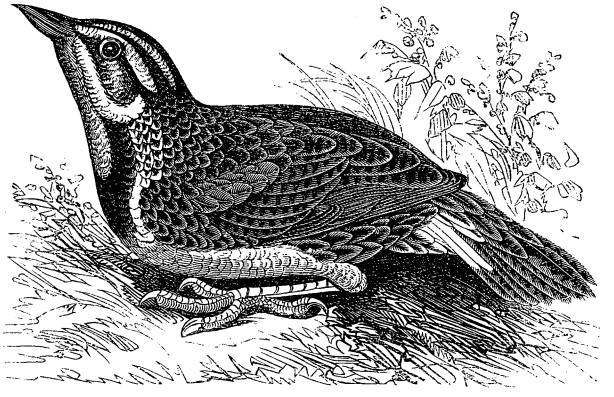
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THE ROSE-COLORED PASTOR.

sheep, and frequently mounts on their backs to find the insects imbedded in their hair and wool. It is a great destroyer of locusts, and on that account is held almost sacred in some parts; found in Asia, Africa, and Southern Europe. The *Pastor tristis* is a closely allied species, found in the Philippine Islands, and having been transported thence to the Mauritius by the colonists, has destroyed nearly all the insects of the island.

Genus PHILESTURNUS: *Philesturnus.*—This includes the CARUNCULATED PHILESTURNUS, *P. carunculatus*, a New Zealand species, brown above and dirty white below. It is very bold, and a great babbler.



THE MEADOW-LARK.

Genus STURNELLA: *Sturnella.*—This includes one of our handsomest and most familiar birds, the MEADOW-LARK—in Virginia the *Old Field-Lark*—*S. Ludoviciana*, ten and a half inches long; body above varied with chestnut, deep brown, and black; neck and breast of a bright yellow, with a large cravat of black. It is migratory, coming to us in summer, and breeding in the meadows as far north as 56°. Its nest is carefully concealed beneath a tuft of grass, being arched over level with the ground. The eggs are from four to five, and white, spotted. It lives on seeds and insects. It is a shy, suspicious bird, and being very alert and swift of flight is shot with some difficulty. It is tough, but is esteemed for the table. It has none of the docility of the European starling, but has a tender and plaintive song during the breeding season, usually uttered at morning and evening from the top of some tall tree. The *S. neglecta* inhabits Western America.

Genus QUISCALUS: *Quiscalus.*—This includes the COMMON CROW-BLACKBIRD, *Q. versicolor*

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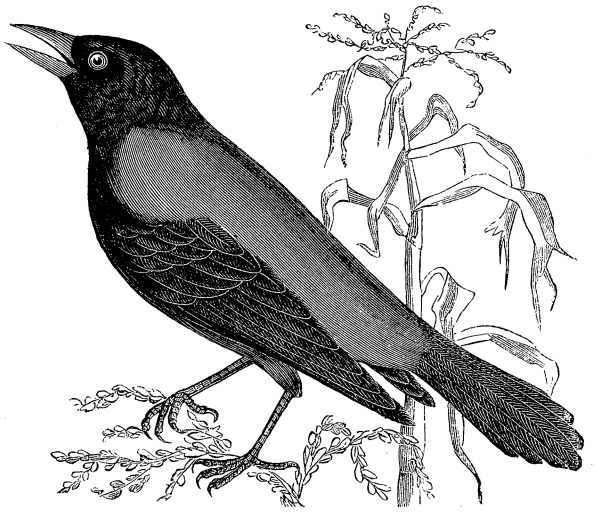


THE CROW-BLACKBIRD.

—*Gracula quiscala* of Wilson—twelve to thirteen inches long; glossy black, with metallic, violet, steel-blue, and green reflections upon the head, neck, and breast; green and blue reflections upon the wings and tail. It has a long, straight bill, with the nostrils placed in triangular grooves on each side of the base. The wings are pointed, and the hind toe is long, and armed with a strong curved claw. From the interior of the upper mandible a sharp, bony process descends into the mouth, resembling the broken blade of a penknife. This is supposed to assist in breaking up the food. The tail is long and graduated, with the sides curved upward, whence the name of *Boat-Tails* has been given to this species. They range from the Gulf of Mexico to fifty degrees north. In the Southern States they are constant residents; in the Middle and Eastern States they are migratory. They appear in loose flocks in April, and, alighting upon the tall trees in the villages, utter a cheerful salutation, as if rejoiced to return to their native haunts. They breed in the orchards and cultivated grounds, making large nests of grass and mud upon trees, and laying five or six dull green eggs, blotched with olive. They feed on grubs, caterpillars, moths, beetles, and grain of various kinds. They are great depredators upon the fields of Indian corn in all their stages, tearing up the planted seed as soon as the infant blade makes its appearance, and devouring the milky kernels upon the ears when they have thus far advanced toward maturity. Scarecrows

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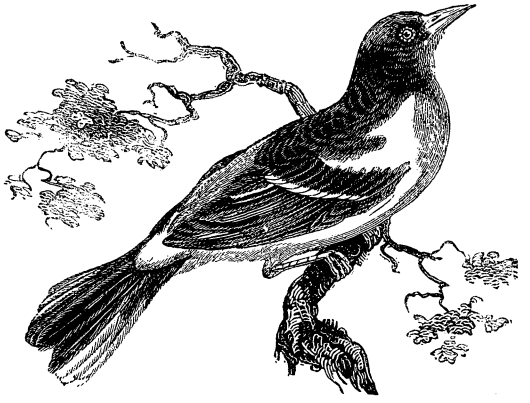
of every imaginable form are spread over the fields of Indian corn as soon as planted, partly intended for the crows, but more especially for these greedy and impudent marauders. When the breeding season is over they gather in immense flocks, usually roosting in the thickets of the swamps; at this time filling the whole air with their notes. In October they take their departure. Their flesh is dark and rank, and unfit for the table. They have some rather pleasing notes, which they will practice in confinement. They may be tamed, and taught to articulate a few words. Of late they appear to be much less abundant than formerly. They have almost deserted some districts where they abounded not many years ago.



THE RUSTY CROW-BLACKBIRD.

The Rusty Crow-Blackbird, *Q. ferrugineus*, is nine and a half inches long; of a rusty black color above, ash beneath; resembles the preceding, and is distributed through the same regions, but is less common.

Other species are the Great Crow-Blackbird, *Q. major*, sixteen inches long; glossy black; tail eight inches long and wedge-shaped; found in the Southern States; and the *Q. Breweri*, ten inches long; glossy black, with purple reflections; found on the upper Missouri.



THE BALTIMORE ORIOLE.

THE ICTERINÆ OR TROOPIALS.

Genus ICTERUS: *Icterus*—nearly corresponding to the *Xanthornus* of Cuvier.—This includes several remarkable species, which may be considered *American Starlings*, though they bear various other names. Some of them are gregarious in their habits, whence they have been

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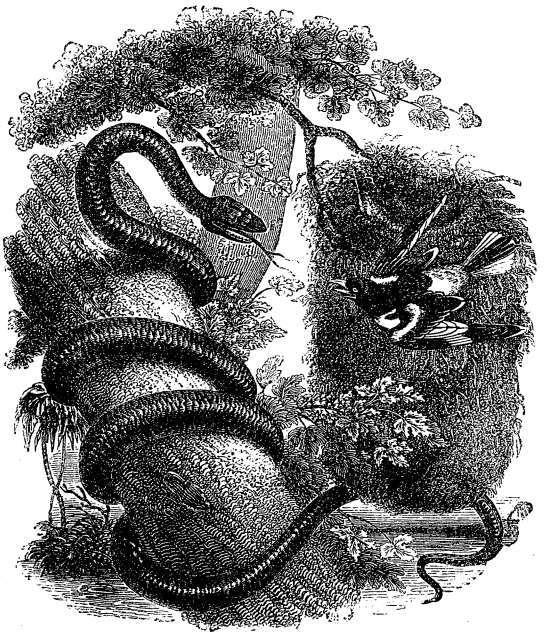
called *Troupiales* by the French and *Troopials* by the English. The most interesting species is the Baltimore Oriole—ranged by Le Maout under the generic name of *Carouge—I. Baltimore*, familiar in all the orchards of the United States. It is seven to eight inches long, of a golden-yellow color, with the head, neck, wings, and tail black; the female yellowish-olive; the food consists of flies, beetles, and caterpillars, and in the destruction of these it is very useful. It has various names, all of which are descriptive, as *Golden Oriole*; *Hang-Bird*, *Fiery Hang-Bird*, *Golden Robin*, and *Baltimore Oriole*, this latter title, it is said, having been bestowed because its black and yellow colors resemble the livery of Lord Baltimore, which was familiar to the colonists of Maryland in the early days of the settlement, that noble family having founded the colony. These birds appear among us from their far southern home in May; their arrival is hailed by young and old as the harbinger of spring and summer. Full of life and activity, these fairy sylphs are now seen glancing through the boughs of the loftiest trees, appearing and vanishing like living gems. The same curious fact exists in respect to them as in respect to many other birds: in the long migration from the south—often several thousand miles—the sexes have been separate; the males arrive several days before the females, not in flocks, but singly. At this time they fill the air with their notes, which, however, are shrill and plaintive, as if their joy was incomplete. Soon their partners arrive, and after many battles between the lovers, the pairing is completed, and amid frolic and song the nest is begun. This is usually the period when the apple-orchards are in bloom, and nothing can afford a picture of more enchanting and vivid beauty than these brilliant birds, in the midst of perfume and showering blossoms, sporting, singing, and rollicking—nay, sipping the honey and feasting on the insects, as if these bowers were all their own. At this time the notes of the male are often a low whistle, or now and then a full trumpet tone, one following the other in slow or rapid succession; even the female sings, though with less melody. Many of the notes of both are colloquial, and it is not difficult for a listener to fancy that he hears questions and answers between the lively couple, with occasional side observations in various keys, indicative of approbation or reproach, admiration or contempt. If a dog or cat chances to approach the neighborhood of the nest, a volley of abuse, in a sharp, rapid tone, is sure to be poured out upon the intruder. The ingenuity of the Golden Robin in building its nest has always excited admiration. Nuttall says: "This is a pendulous, cylindric pouch, of five to seven inches in depth, usually suspended from near the extremities of the high drooping branches of trees, such as the elm, the pear, or apple-tree, wild cherry, weeping-willow, tulip-tree or button-wood. It is begun by firmly fastening natural strings of the flax, of the silk-weed or swamp-holyhock, or stout artificial threads, round two or more forked twigs, corresponding to the intended width and depth of the nest. With the same materials, willow-down, or any accidental ravelings, strings, thread, sewing-silk, tow, or wool that may be lying near the neighboring houses, or round the grafts of trees, they interweave and fabricate a sort of coarse cloth into the form intended, toward the bottom of which they place the real nest, made chiefly of lint, wiry grass, horse and cow-hair, lining the interior with a mixture of slender strips of smooth vine-bark, and rarely, with a few feathers, the whole being of a considerable thickness, and more or less attached to the external pouch. Over the top, the leaves, as they grow out, form a verdant and agreeable canopy, defending the young from the sun and rain. There is sometimes a considerable difference in the manufacture of these nests, as well as the materials which enter into their composition. Both sexes seem to be equally adepts at this kind of labor, and I have seen the female alone perform the whole without any assistance, and the male also complete this laborious task nearly without the aid of his consort, who, however, is in general the principal worker. I have observed a nest made almost wholly of tow, which was laid out for the convenience of a male bird, who, with this aid, completed his labor in a very short time, and frequently sung in a very ludicrous manner while his mouth was loaded with a mass larger than his head. So eager are they to obtain fibrous materials, that they will readily try at, and even untie, hard knots made of tow."

The eggs of this bird are four to five, white, with a bluish tint, and faint brown lines and spots at the larger end. It raises two broods in a season. It is easily tamed, and is docile and playful in confinement. It has a turn for mimicry, and often adopts for its song the notes of other birds.

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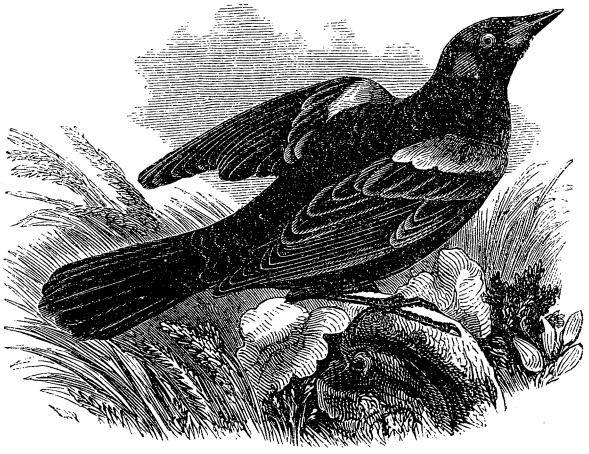
The Orchard-Oriole, *I. spurius*, is six and a half inches long; color bright bay; head, neck, back, and wings black, it feeds on crickets, grasshoppers, spiders, and larvæ, and occasionally on young fruits and berries. It builds its nest like the preceding, though it is not so pendulous, it being firmly attached all around its margin. The eggs are bluish-white, speckled with brown. This species ranges from the equator to the State of Maine, though it is rare in Northern New England; at the south it is even more common than the golden robin.

Beside these there are several other species in South America, some of which build their pendulous nests in considerable numbers upon the same tree. Mr. Edwards, in his voyage up the Amazon, saw forty-five nests in one small tree, of the two species, *Cacicus icteronotus* and *C. hæmorrhous*. Some of them were two feet in length, with an opening near the top. These were woven of grass, and one nest often depended from another, so that the tree was entirely covered and concealed, except only some of the topmost branches. These nests are built in this manner to protect them from the snakes and monkeys that abound in these hot climates.



ORIOLE AND SERPENT IN SOUTH AMERICA.

The Red-winged Oriole, *I. phœniceus*, is seven and a half inches long, color black, lesser tail-coverts red; the female striate with brown and whitish. It is called by the various names of *Swamp-Blackbird*, *Red-winged Blackbird*, *Red-winged Starling*, and *Corn-Thief*. Its range is from Mexico to Nova Scotia; it is migratory north of Maryland, and stationary south of it. The nests are built in swampy places, on low bushes, or in a tussock of grass, the eggs are three to five, white, tinged with blue, and marked with faint purple streaks; two broods are produced in a season; the food consists of insects and their larvæ, and also green corn and wild rice, with other



THE RED-WINGED BLACKBIRD.

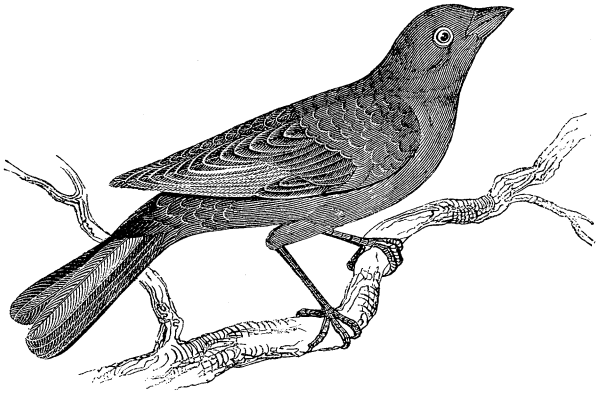
seeds. In September they gather in immense flocks, and often do great damage to the crops, especially on the plantations of the Middle and Southern States near the sea-shore. During the

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breeding season the male has a few plaintive notes, usually uttered when some danger is apprehended from an intruder; the bird possesses a high ventriloquial power; often its voice seems to come from a point near at hand, while it is in fact at the distance of ten or fifteen rods. When assembled in flocks, the whole troop join in a chorus, especially at morning and evening, and often fill the whole air with their somewhat discordant anthems. These birds pair, but yet a sort of partial polygamy prevails among them; they readily submit to confinement, and cheerfully sing their monotonous ditty in reward of attentions bestowed upon them; in some instances they have been taught to articulate words. Their flesh is not greatly esteemed.

Among numerous species of birds which have of late been brought within the list of those belonging to our own country, in consequence either of the extension of our territories, so as to include Texas, New Mexico, and California, or the new researches that have been made in these regions, we may mention the BLACK-HEADED ORIOLE, *I. melanocephalus*, beautifully figured by Cassin. It is nine inches long; head black, back and rump yellowish-green, wings black, under parts bright yellow; found in Texas and Mexico.

Other species are as follows: *I. xanthocephalus*, nine inches long; general color black; head, neck, and breast yellow-orange; found in Missouri and Texas: *I. tricolor*, nine inches long; bluish-black; lesser wing-coverts carmine; found in California: *I. gubernator*, nine inches long; glossy bluish-black; found on the Columbia River: *I. Bullockii*, seven inches long; black; back, rump, and belly yellow; found on the Columbia River: *I. Audubonii*, eight and a half inches long; black and greenish-yellow; found in Texas: *I. vulgaris*, black and yellow; found in South Carolina; and *I. cucullatus*, seven and a half inches long, found in Texas and Mexico.



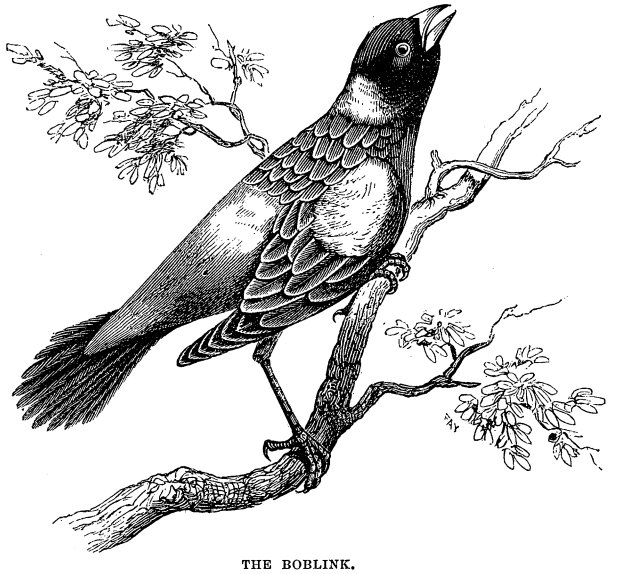
THE COW-BLACKBIRD.

Genus MOLOTHRUS: *Molothrus*.—This includes the COW-BLACKBIRD—called by the various names of *Cow-Pen-Bird*, *Cow-Troopial*, and *Cow-Bunting*—*M. pecoris*; it is seven inches long; the head and neck blackish-brown; the rest black. It is perpetually migratory and gregarious, moving to the north in April, and usually at night, and retiring to its southern home in October. Most of them pass the winter in the tropical regions; some, however, remain in the Southern States. While most other birds pair in spring, these release themselves from all hinderance in their wanderings, and continue to live in flocks, and in a state of general concubinage. Of all the feathered tribes, this and the European cuckoo, with a few of its congeners belonging to the eastern continent, and one South American species of *Molothrus*, allied to the one we are describing, are, so far as we know, the only ones that do not build nests and rear their young. This, it is manifest, is not an accident or a vice; though they continually resort to deception to procure the hatching of their eggs, it is the result of a system springing from a universal and abiding instinct. The whole family, from the beginning, has been a race of foundlings. This seems like a caprice in nature, or rather a contradiction of its general principles; but such views are, doubtless, the result of our ignorance.

The number of nurses selected by this vagrant is considerable, the great favorites being the *Red-eyed Fly-Catcher*, the *White-eyed Fly-Catcher*, the *Maryland Yellow-Throat*, the *Chipping-*

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Bird, the *Song-Sparrow*, the *Meadow-Lark*, *Yellow Warbler*, *Blue-Gray Fly-Catcher*, *Golden-crowned Thrush*, and *Wilson's Thrush*. When the female is disposed to lay, she steals through the bushes and brambles till she finds the nest that suits her; she then slyly and quickly deposits her egg, and immediately proceeds back to the flock. The strange egg is often a subject of wonder or surprise to the lawful proprietor of the nest; sometimes it causes a desertion of the premises; more commonly, however, it is duly hatched, and the young one carefully reared. Sometimes the athletic parasite stifles the legitimate offspring, in which case the lifeless remains are removed by the parents, who yet—unconscious of the cause of the mischief—continue to feed and cherish it as their own child. When fully fledged, the young bird departs and skulks about for a time, when at last, guided by instinct, he joins the flock of his kith and kin. They are now seen in small parties around the cattle in the cow-pen or the pastures, feeding on the seeds and worms which they pick up among the fodder or the excrements of these domestic animals. They seem to have an affinity with the red-winged blackbirds, and often large flocks of the two kinds may be seen together, sometimes feeding in the fields of corn and rice, and sometimes wheeling and winding in blackening masses through the air. The cow-blackbird has no song, and possesses few attractive qualities; in confinement it utters a low, guttural splutter, intended for music, at the same time strutting before the spectator with the affected airs of a turkey-cock.



THE BOBLINK.

Genus DOLYCHONIX: *Dolychonix.*—This includes the *D. orizivorus*, one of our most curious, eccentric, and amusing birds, the harlequin of the meadows, known at the north by the names of BOBLINK, or BOB-O'-LINK, or BOB-O'-LINCOLN, to which may be added the various titles of *Reed-Bird*, *Rice-Bird*, *Rice-Bunting*, *May-Bird*, *Meadow-Bird*, *American Ortolan*, *Butter-Bird*, and *Skunk-Blackbird*. It is six and a half inches long; color black; head and rump white, tinged with yellow. This is the full spring costume of the male; the female is brownish-black and yellow above, dull yellow beneath. This is nearly the appearance of the young birds, and also of the male in autumn. These birds migrate northward in spring, proceeding by night, and retire in October, flying by day. They feed on crickets, grasshoppers, beetles, spiders, and seeds of various kinds, particularly those of grasses. Their range is from Mexico to Canada. The eggs, four or five in number, are bluish-white, spotted, and placed in a nest on the ground, usually in the meadows. The "song of the male," says Wilson, "while the female is sitting, is singular and very agreeable. Mounting and hovering on wing, at a small height above the field, he chants out such a jingling medley of short, variable notes, uttered with such seeming confusion and rapidity, and continued for a considerable time, that it appears as if half a dozen birds

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of different kinds were all singing together. Some idea may be formed of this song by striking the high keys of a piano-forte at random, singly and quickly, making as many sudden contrasts of high and low notes as possible. Many of the tones are, in themselves, charming; but they succeed each other so rapidly that the ear can hardly separate them. Nevertheless, the general effect is good; and, when ten or twelve are all singing on the same tree, the concert is singularly pleasing."

The manner in which this bird strikes the pop lar imagination is happily illustrated by two of our most eminent writers, Irving and Bryant; and although we have already noticed it at some length (see p. 12), we surely need offer no apology for giving these accurate and felicitous delineations:

"The happiest bird of our spring," says Irving, "and one that rivals the European lark in my estimation, is the Boblincon or Boblink, as he is commonly called. He arrives at that choice period of our year which, in this latitude, answers to the description of the month of May, so often given by the poets. With us, it begins about the middle of May, and lasts until nearly the middle of June. Earlier than this winter is apt to return on its traces, and to blight the opening beauties of the year; later than this begin the parching and panting and dissolving heats of summer. But in this genial interval nature is in all her freshness and fragrance; 'the rains are over and gone, the flowers appear upon the earth, the time of the singing birds is come, and the voice of the turtle is heard in the land.' The trees are now in their fullest foliage and brightest verdure; the woods are gay with the clustered flowers of the laurel; the air is perfumed by the sweet-brier and the wild rose; the meadows are enameled with clover-blossoms; while the young apple, the peach, and the plum begin to swell, and the cherry to glow among the green leaves.

"This is the chosen season of revelry of the boblink. He comes amid the pomp and fragrance of the season; his life seems all sensibility and enjoyment, all song and sunshine. He is to be found in the soft bosoms of the freshest and sweetest meadows, and is most in song when the clover is in blossom. He perches on the topmost twig of a tree, or on some long, flaunting weed, and as he rises and sinks with the breeze, pours forth a succession of rich tinkling notes, crowding one upon another like the outpouring melody of the sky-lark, and possessing the same rapturous character. Sometimes he pitches from the summit of a tree, begins his song as soon as he gets upon the wing, and flutters tremulously down to the earth, as if overcome with ecstasy at his own music. Sometimes he is in pursuit of his paramour; always in full song, as if he would win her by his melody, and always with the same appearance of intoxication and delight.

"Of all the birds of our groves and meadows, the boblink was the envy of my boyhood. He crossed my path in the sweetest weather and the sweetest season of the year, when all nature called to the fields, and the rural feeling throbbed in every bosom, but when I, luckless urchin! was doomed to be mured up during the livelong day in that purgatory of boyhood, a school-room. It seemed as if the little varlet mocked at me as he flew by in full song, and sought to taunt me with his happier lot. Oh, how I envied him! No lessons, no task, no hateful school; nothing but holiday, frolic, green fields, and fine weather. Had I been then more versed in poetry, I might have addressed him in the words of Logan to the cuckoo:

'Sweet bird! thy bower is ever green,
Thy sky is ever clear;
Thou hast no sorrow in thy note,
No winter in thy year.

'Oh! could I fly, I'd fly with thee,
We'd make, on joyful wing,
Our annual visit round the globe,
Companions of the spring!'

"Further observation and experience have given me a different idea of this little feathered voluptuary, which I will venture to impart for the benefit of my school-boy readers, who may regard him with the same unqualified envy and admiration which I once indulged. I have shown him only as I saw him at first, in what I may call the poetic part of his career, when he in a manner devoted himself to elegant pursuits and enjoyments, and was a bird of music, and song, and taste, and sensibility, and refinement. While this lasted he was sacred from injury; the very school-boy would not fling a stone at him, and the merest rustic would pause to listen to his strain. But mark the difference. As the year advances, as the clover blossoms disappear, and the spring fades into summer, he gradually gives up his elegant tastes and habits, doffs his poetical suit of

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black, assumes a russet, dusky garb, and sinks to the gross enjoyments of common, vulgar birds. His notes no longer vibrate on the ear; he is stuffing himself with the seeds of the tall weeds, on which he lately swung and chanted so melodiously. He has become a 'bon-vivant,' a 'gourmand;' with him now there is nothing like the 'joys of the table.' In a little while he grows tired of plain, homely fare, and is off on a gastronomical tour in quest of foreign luxuries. We next hear of him, with myriads of his kind, banqueting among the reeds of the Delaware, and grown corpulent with good feeding. He has changed his name in traveling: Boblincon no more, he is the *Reed-Bird* now, the much sought for titbit of Pennsylvania epicures; the rival in unlucky fame of the ortolan! Wherever he goes, pop! pop! pop! every rusty firelock in the country is blazing away. He sees his companions falling by thousands around him.

"Does he take warning and reform? Alas, not he! Incorrigible epicure! again he wings his flight. The rice-swamps of the South invite him. He gorges himself among them almost to bursting; he can scarcely fly for corpulency. He has once more changed his name, and is now the famous *Rice-Bird* of the Carolinas.

"Last stage of his career: behold him spitted with dozens of his corpulent companions, and served up a vaunted dish on the table of some Southern gastronome.

"Such is the story of the boblink: once spiritual, musical, admired, the joy of the meadows, and the favorite bird of spring; finally, a gross little sensualist, who expiates his sensuality in the larder. His story contains a moral worthy the attention of all little birds and little boys, warning them to keep to those refined and intellectual pursuits which raised him to so high a pitch of popularity during the early part of his career; but to eschew all tendency to that gross and dissipated indulgence which brought this mistaken little bird to an untimely end."

Bryant speaks in a gayer humor:

"Merrily swinging on briar and weed,
Near to the nest of his little dame,
Over the mountain, river, and mead,
Robert of Lincoln is telling his name:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Snug and safe is that nest of ours,
Hidden among the summer flowers,
Chee, chee, chee.

"Robert of Lincoln is gaily drest,
Wearing a bright blue wedding-coat,
White on his shoulders and white his crest,
Hear him call, in his merry note:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Look what a nice new coat is mine,
Sure there was never a bird so fine,
Chee, chee, chee.

"Robert of Lincoln's Quaker wife,
Pretty and quiet, with plain brown wings,
Passing at home a patient life,
Breeds in the grass while her husband sings:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Brood, kind creature, and never fear
Thieves or robbers while I am here,
Chee, chee, chee.

"Modest and shy as a nun is she,
One weak chirp is her only note;
Braggart and prince of braggarts is he,
Pouring boasts from his little throat:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Never was I afraid of man,
Catch me, cowardly knaves, if you can,
Chee, chee, chee.

"Six white eggs on a bed of hay,
Flecked with purple, a pretty sight:
There as the mother sits all day,
Robert is singing with all his might:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Nice good wife that never goes out,
Keeping home while I frolic about,
Chee, chee, chee.

"Soon as the little ones chip the shell,
Six wide mouths are open for food;
Robert of Lincoln bestirs him well,
Gathering seeds for the hungry brood:
Bob-o'-link, bob-o'-link,
Spink, spank, spink.
This new life is likely to be
Hard for a gay young fellow like me,
Chee, chee, chee.

"Robert of Lincoln at length is made
Sober with work and silent with care;
Off is his holiday garment laid,
Half-forgotten that merry air:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
Nobody knows but my wife and I
Where our nest and our nestlings lie,
Chee, chee, chee.

"Summer wanes—the children are grown,
Leisure and frolic no more he knows;
Robert of Lincoln's a hum-drum crone,
Off he flies, and we sing as he goes:
Bob-o'-link, bob-o'-link,
Spink, spank, spink;
When you can pipe that merry old strain,
Robert of Lincoln, come again,
Chee, chee, chee."

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Such is the Bobolink of our meadows, and such has he been from "creation's dawn"—a gay, rollicking fellow, satisfied with himself, and therefore content with the world around him. We, in our conceit, imagine that he lives in our fields because he loves us, and that he sings because his song pleases us; but the fact is, that he prefers our meadows only because they afford him food and shelter. He is not indebted to man for his existence, nor dependent upon man for his happiness. No doubt that he and his kindred migrated to these temperate zones, and built their nests and poured out their ditties, just as they do now, in the dim ages of the past, long, long before civilized man had settled or even discovered America. The morning and the evening hymn of these birds filled the air when only the stolid Indian was their listener, or even before, just as at the present day. The other familiar birds—robins, sparrows, bluebirds, orioles, fly-catchers, swallows—which nestle around our houses, are attracted to these places, not by any sympathy with man, but by the fruits he produces, and the worms and insects that flourish in the rich soil which he creates; perchance in some cases by the protection which the presence of man affords to them and their offspring, from hawks, owls, eagles, and other enemies. Birds are quick observers; if by chance one of them finds a feast in a field, in his visits to it he is noticed, and thus becomes a telegraph to others. In the spring of 1858 I had a rich garden-lot plowed up and laid down to grass, sowing it first with oats and then with grass-seed. In a week it was the general resort of birds of many kinds—robins, orioles, cat-birds, blackbirds, sparrows, linnets, and finches. The circumstances permitted me to observe their proceedings, and I readily perceived that the orioles, seeing the robins attracted to this spot, followed them; the cat-birds followed the orioles, the blackbirds followed the cat-birds, and so on. A group of school-boys are not sooner informed of a deposit of nuts, than are the birds, of a harvest of seeds or insects. Thus it is that cultivated districts become the chief resort of many species, especially during the breeding season. By the facilities of support thus afforded, many kinds of birds may be, and doubtless are, increased in numbers; many, certainly, are thus drawn around the abodes of man. But by far the larger part of the birds throughout the world are never seen by man. Not a twentieth part of the world's surface is occupied even by the thousand millions of human inhabitants. The morning—that daily miracle of the universe—that diurnal creation of a world of light out of the chaos of darkness—rises upon the surface of the boundless sea, the lone mountain, the remote wilderness, scattering on every side its light, and everywhere waking its anthem of life, though man is not there to witness it, or to participate in it. The depths of the ocean are illumined with gems and coral, and fishes of purple and gold, yet from these boundless realms man is forever banished. The gorgeous trogons of Central America, the superb macaws of Brazil, the glittering touracos of Africa, the satin bower-birds of Australia—the myriads of feathered tribes, either glorious in the splendor of their plumage or the melody of their songs—have enlivened their native haunts for thousands of years without the presence of man; nay, the very instincts of many of these birds, endowed with surpassing beauty, lead them to hide their splendors in the remote, undiscovered recesses of the wilderness. Here, in these hermit retreats, they flourish, singing, sporting, and spreading their golden feathers to the sun, so long as man is not there; when he approaches, they dwindle away and perish; for man, in respect to many of the feathered tribes, is not their friend, but their enemy and destroyer. In the Astor Library is a magnificent work by Gould on the birds of Australia—seven volumes, folio—and all these diversified tribes—some of them of a splendor of plumage that defies description—have remained till the present century unknown to civilized man. Nay, whole races of birds, with all their shining feathers and delicious melody, have lived, flourished, and passed away, ages before man was an inhabitant of the earth. It is manifest that man, in a physical sense, is not necessary to the great movement of life and light, of majesty and dominion, in the universe. He is only a humble incident in creation; the birds sing and the trees wave, equally unconscious of his presence and his absence. They were not made for him, nor he for them; all are subservient to the Creator. How strange, how mysterious, how humiliating is the state of man, self-banished, by atheistic doubt or infidelity, from the great Author of Life and Light, since he, and he alone, of all created things, can know his isolation and appreciate his condition; how glorious his hopes and expectations, when viewed in that Mirror of Faith which carries him beyond this transient being—this alliance with birds and beasts—into everlasting communion with his Maker!

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THN FLUTE-PLAYING CASSICAN.



THE HOODED-CROW OF EUROPE.

THE CORVIDÆ OR CROWS.

This family includes not only the typical crows, but a number of other groups, as the *Piping-Crows*, the *Jays*, the *Tree-Crows*, the *Magpies*, *Choughs*, *Jackdaws*, and *Paradise Birds*. These are all omnivorous, feeding on fruits and animal substances of various kinds.

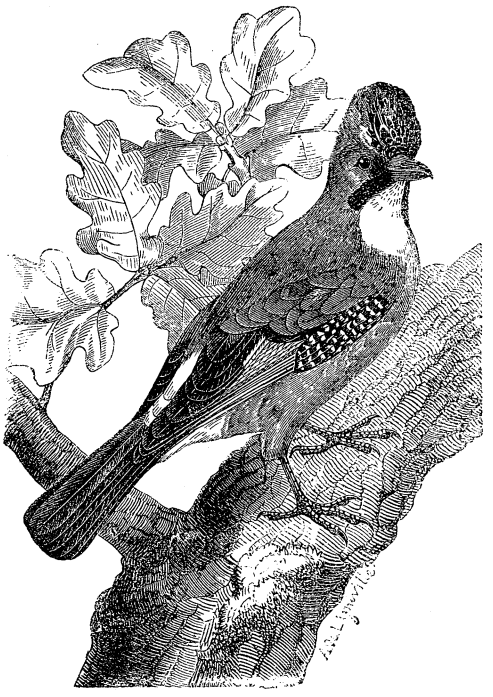
THE STREPERINÆ OR PIPING-CROWS.

These birds—the *Cassicans* of some authors; the *Baritas* of Cuvier—belong to Australia and the adjacent islands: they are distinguished from the other Corvidæ by the form of the nostrils, each of which consists of a long, narrow slit in the substance of the bill, and is usually completely exposed. The bill itself is long and compressed, broad at the base, where the ridge projects upon the forehead, and the tip is more or less notched. They are restless, noisy, and omnivorous like other crows, but, unlike them, they have some musical notes. One species, the FLUTE-PLAYING CASSICAN, *Gymnorhina tibicen*, is of a grayish-brown color, and is very voracious, even devouring small birds. The WAKENING CASSICAN, *Coracias strepera* of Latham, is found in Norfolk Island; it never sleeps at night, but keeps the country round awake by its sonorous cries.

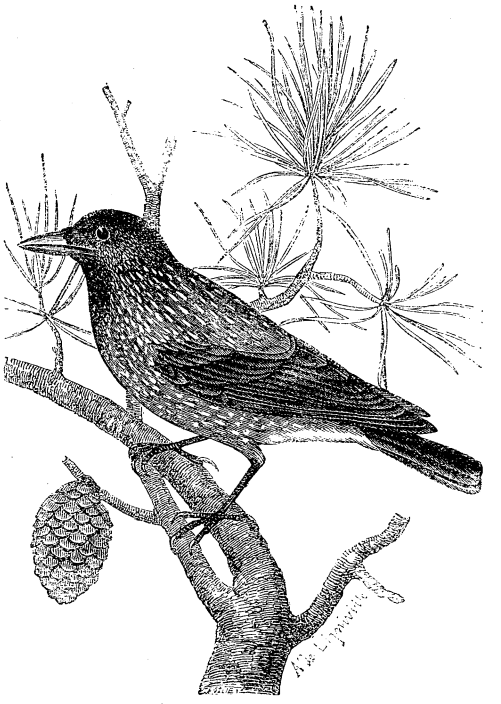
THE GARRULINÆ OR JAYS.

Genus GARRULUS: *Garrulus.*—This includes the COMMON JAY OF EUROPE—the *Gaza Verla* of the Italians, the *Geai* of the French, and *Holz-Häher* of the Germans—*G. glandarius.* It is a very beautiful bird, sixteen inches long, of a light reddish-brown color, with the primary wing-coverts bright blue, elegantly banded with black. The feathers of the fore part of the head are whitish, spotted with black, and elongated so as to form a crest, which the bird can erect at pleasure; the quill-feathers of the wings and tail, and a streak on each side of the chin, are black. It is common throughout Europe; inhabits thick woods, and is shy in its habits. It feeds to a great extent upon vegetable matters, such as acorns and beech-mast, and in summer often visits gardens, tempted by the cultivated fruits. It also feeds on insects and worms. Its nest is formed in tall bushes, or in the lower branches of trees; but always well concealed among

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THE EUROPEAN JAY.



THE EUROPEAN NUT-CRACKER. (See p. 195.)

the leaves. It is cup-shaped, formed of small sticks, and lined with finer materials, such as small roots and grass; the eggs are five or six in number. It is of a lively disposition, and has a trick of concealing objects and laying up stores like the magpie. It is capable of some education, and has great powers of imitation. In a state of nature it has been known to mimic the voices of other animals so exactly that it was difficult to believe that the creatures personated were really absent. Montagu says, that in the spring the Jay will sometimes utter a sort of song, which he describes as soft and pleasing, but into which it introduces at intervals the bleating of a lamb, the mewing of a cat, the note of a kite or buzzard, the hooting of an owl, and even the neighing of a horse and similar sounds. In confinement, of course, a wider field is opened for the bird's talents for mimicry; and it usually takes advantage of its position to pick up and repeat every sound with which it is familiar. Thus Bewick mentions a Jay that imitated "the sound of a saw so exactly that, though it was on a Sunday, we could hardly be persuaded that there was not a carpenter at work in the house." Mr. Yarrell also refers to one of these birds, in the possession of a surgeon in Berkshire, which, before it was twelve months old, imitated the ordinary household sounds with astonishing accuracy. He would give what might be called a *Poultry-yard Entertainment*, imitating the calling of the fowls to feed, and all the noises of the fowls themselves in perfection; but the crowing of the cock was not managed so well. The barking and noises of the house-dog were imitated in a style that could not be distinguished from the original.

Among several other foreign species of Jay are the *G. infaustus*, somewhat smaller than the preceding, found in Northern Europe; and the *G. lanceolatus* and *G. bispecularis*, both of India.

In America the jays are more numerous than in the other hemisphere, though they chiefly belong to the warmer regions of this continent. The prevailing hues are different shades of blue, variegated with white, black, or yellow. They generally possess the characteristics of cunning and the turn for mimicry belonging to the European jay. The prominent species in the United States is the Blue Jay, *G. cristatus*. This is eleven inches long; light purplish-blue above; beneath white, with a faint bluish tinge. It is migratory in New England, but becomes sedentary in the Middle States; found from Texas to Canada. Wilson says: "This elegant bird is distinguished as a kind of beau among the feathered tenants of our woods, by the brilliancy of his

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dress; and, like most other coxcombs, makes himself still more conspicuous by his loquacity, and the oddness of his tones and gestures. He is an almost universal inhabitant of the woods, frequenting the thickest settlements as well as the deepest recesses of the forest, where his squalling voice often alarms the deer, to the disappointment and mortification of the hunter; one of whom informed me, that he made it a point, in summer, to kill every jay he could meet with. In the charming season of spring, when every thicket pours forth harmony, the part performed by the jay always catches the ear. He appears to be among his fellow-musicians what the trumpeter is in a band, some of his notes having no distant resemblance to the tones of that instrument. These he has the faculty of changing through a great variety of modulations, according to the particular humor he happens to be in. When disposed for ridicule, there is scarce a bird whose peculiarities of song he cannot tune his notes to. When engaged in the blandishments of love, they resemble the soft chatterings of a duck, and, while he nestles among the thick branches of the cedar, are scarce heard at a few paces' distance; but he no sooner discovers your approach than he sets up a sudden and vehement outcry, flying off, and screaming with all his might, as if he called the whole feathered tribes of the neighborhood to witness some outrageous usage he had received. When he hops undisturbed among the high branches of the oak and hickory, they become soft and musical; and his calls of the female, a stranger would readily mistake for the repeated screakings of an ungreased wheelbarrow. All these he accompanies with various nods, jerks, and other gesticulations, for which the whole tribe of jays are remarkable.

"This bird builds a large nest, frequently in the cedar, sometimes on an apple-tree, lines it with dry fibrous roots, and lays five eggs, of a dull olive, spotted with brown. The male is particularly careful of not being heard near the place, making his visits as silently and secretly as possible. His favorite food consists of chestnuts, acorns, and Indian corn. He occasionally feeds on bugs and caterpillars, and sometimes pays a plundering visit to the orchard, cherry-rows, and potato-patch; and has been known, in times of scarcity, to venture into the barn, through openings between the weather-boards. In these cases he is extremely active and silent, and, if surprised in the fact, makes his escape with precipitation, but without noise, as if conscious of his criminality.

"Of all birds, he is the most bitter enemy of the owl. No sooner has he discovered the retreat of one of these, than he summons the whole feathered fraternity to his assistance, who surround the glimmering *solitaire*, and attack him from all sides, raising such a shout as may be heard, in a still day, more than half a mile off. When, in my hunting excursions, I have passed near this scene of tumult, I have imagined to myself that I heard the insulting party venting their respective charges with all the virulency of a Billingsgate mob; the owl, meanwhile, returning every compliment with a broad, goggling stare. The war becomes louder and louder, and the owl at length, forced to betake himself to flight, is followed by his whole train of persecutors, until driven beyond the boundaries of their jurisdiction.

"But the blue jay himself is not guiltless of similar depredations with the owl, and becomes in his turn the very tyrant he detested, when he sneaks through the woods, as he frequently does, and among the thickets and hedge-rows, plundering every nest he can find of its eggs, tearing up the callow young by piecemeal, and spreading alarm and sorrow around him. The cries of the distressed parents soon bring together a number of interested spectators—for birds in such circumstances seem truly to sympathize with each other—and he is sometimes attacked with such spirit as to be under the necessity of making a speedy retreat.

"He is not only bold and vociferous, but possesses a considerable talent for mimicry, and seems to enjoy great satisfaction in mocking and teasing other birds, particularly the sparrow-hawk, imitating his cry wherever he sees him, and squealing out as if caught; this soon brings a number of his own tribe around him, who all join in the frolic, darting about the hawk, and feigning the cries of a bird sorely wounded, and already under the clutches of its devourer; while others lie concealed in bushes, ready to second their associates in the attack. But this ludicrous farce often terminates tragically. The hawk, singling out one of the most insolent and provoking, sweeps upon him in an unguarded moment, and offers him up a sacrifice to his hunger and resentment. In an instant the tune is changed; all their buffoonery vanishes, and loud and incessant screams proclaim their disaster.

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BLUE JAYS.

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"Wherever the jay has had the advantage of education from man, he has not only shown himself an apt scholar, but his suavity of manners seems equalled only by his art and contrivances, though it must be confessed, that his itch for thieving keeps pace with all his other acquirements. Dr. Mease informs me, that a blue jay, which was brought up in the family of a gentleman, had all the tricks and loquacity of a parrot; pilfered every thing he could conveniently carry off, and hid them in holes and crevices; answered to his name with great sociability when called on; could articulate a number of words pretty distinctly; and, when he heard an uncommon noise, or loud talking, seemed impatient to contribute his share to the general festivity, by a display of all the oratorical powers he was possessed of.

"Mr. Bartram relates an instance of the jay's sagacity worthy of remark. 'Having caught a jay in the winter season,' says he, 'I turned him loose in the green-house, and fed him with corn, the heart of which they are very fond of. This grain being ripe and hard, the bird at first found a difficulty in breaking it, as it would start from his bill when he struck it. After looking about, and, as if considering for a moment, he picked up his grain, carried and placed it close up in a corner on the shelf, between the wall and a plant-box, where, being confined on three sides, he soon effected his purpose, and continued afterward to make use of this same practical expedient.' 'The jay,' continues this judicious observer, 'is one of the most useful agents in the economy of nature for disseminating forest trees and other ruciferous and hard-seeded vegetables on which they feed. Their chief employment, during the autumnal season, is foraging to supply their winter stores. In performing this necessary duty, they drop abundance of seed in their flight over fields, hedges, and by fences, where they alight to deposit them in the post-holes, &c. It is remarkable what numbers of young trees rise up in fields and pastures after a wet winter and spring. These birds alone are capable, in a few years' time, to replant all the cleared lands.'"

The Canada Jay, *G. Canadensis*, is ten inches long; head black; back leaden-gray; beneath light leaden-brown. It is a northern bird, but found occasionally in the winter as far south as New York, where it is called the *Carrion-Bird*. The *G. Stelleri* is generally of a blue color, head and neck blackish; tail long; whole length twelve inches; found in Mexico. The *G. Floridensis* is eleven to twelve inches long; back light yellowish-brown; head, wings, and tail blue; beneath gray; found in Florida and the Western States. The *G. ultramarinus* is twelve inches long, blue and brownish-olive; found in California. The Mexican Jay, *Cyanocorax luxuosus*, beautifully figured by Cassin, has the head blue and black, and the body a parrot-like green; it is above twelve inches long, and found in Texas and Mexico. Prince Maximilian's Jay, *Gymnokitta cyanocephala*, also figured by Cassin, is ten inches long; color ashy-blue; found in New Mexico and Nebraska. There are several other species in North America.

Among the South American species are the Great Crested Jay, *Cyanocorax pileatus*, *C. violaceus*, *C. azureus*, *Cyanocitta ornata*, &c.

Genus NUCIFRAGA: *Nucifraga*.—To this belongs the Nut-Cracker, *N. caryocatactes*—the *Casse noix* of the French: size of the European jay; color umber-brown, dappled with white spots; nestles in hollow trees; the eggs five or six; feeds on insects, the seeds of pine, and berries; sometimes on young birds and eggs; it cracks nuts in the same manner as the nut-hatch; found in Central Europe; rare in England. There are varieties of pure white and yellowish-white.

THE CALLÆATINÆ OR TREE-CROWS.

In these birds the upper mandible is not toothed at the tip; the bill is short, with the ridge much elevated at the base, and considerably curved; the wings are short and rounded, the tail long, the tarsi covered with transverse scales, and the two lateral toes are unequal. The species are peculiar to the eastern hemisphere, of which they generally inhabit the warmer regions. The typical species, *Callæas cinerea*, sometimes called the New Zealand Crow, in its habits resembles the ordinary crows, feeding on fruits, insects, and occasionally on small birds; its general color is a greenish-black, and on each side of the head there is a small wattle of a bright blue tint.

THE CORVINÆ OR TRUE CROWS.

These, like the preceding, are destitute of the teeth at the tip of the upper mandible, the ridge

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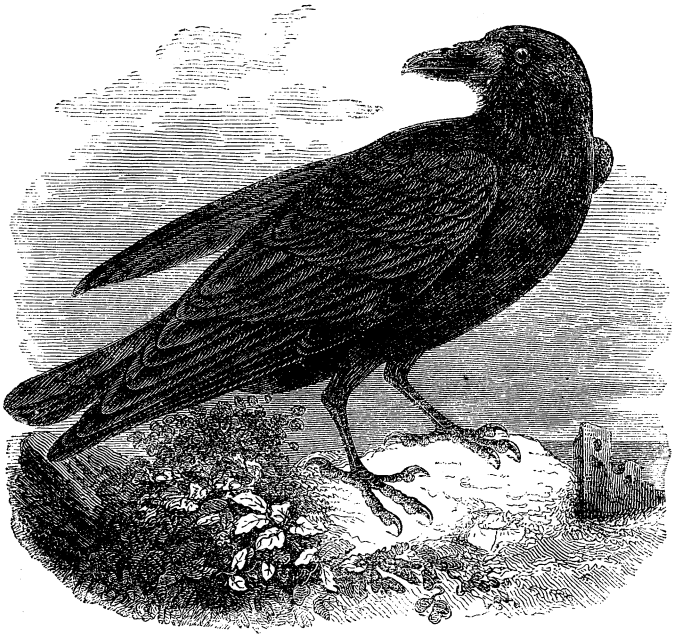


THE GREAT CRESTED JAY. (See p. 195.)

of which is more or less curved; the wings are long, and very slightly rounded, the tail variable in form, the tarsi long, and covered with transverse scales, and the two lateral toes are equal. Some of this species are undoubtedly the most intelligent of the feathered races.

Genus CORVUS: *Corvus.*—At the head of this stands the RAVEN, *C. corax*, among the most remarkable of the feathered races. It is two feet long; its color black, tinged with violet. Like all the corvine birds, it has a high, round, knife-shaped beak, provided with bristles at the base, which incline forward. It is common to the northern parts of both continents; builds in wooded districts; lays from three to five eggs of a soiled-green color, spotted with olive-brown. Its food consists of dead animal matter, even carrion, with worms, grubs, reptiles, birds' eggs, fish, and shell-fish. It is also charged with carrying off young ducks and chickens from the farms that chance to be near its haunts. It is exceedingly intelligent, and can be taught to articulate words; it lives to a great age, a hundred years or more it is said, and from early periods of history has been connected with various popular superstitions. In the Bible we are told that at the end of forty days, after the great flood had covered the earth, Noah, wishing to ascertain whether or no the waters had abated, sent forth a raven, which did not return into the ark. This is the first historical notice of this species. Though the raven was declared unclean by the law of Moses,

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THE RAVEN.

yet, when the prophet Elijah provoked the enmity of Ahab, by prophesying against him, and hid himself by the Brook Cherith, the ravens were appointed by heaven to bring him his daily food. But, though thus honored, this bird seems in all ages to have been considered ominous of evil. In the days of auguries and divination, it was used by the priests as the instrument of foretelling future events, and all its actions, its flight, and every modulation of its croakings, were watched as the awful suggestions of prophecy. In most cases, the managers of these oracles were impostors, using them only as means of gaining an ascendency over the people; the latter, however, were real believers, and in some cases their credulity was so great that individuals ate the heart and entrails of the raven, under the idea that its prophetic faculty would thus pass into their possession! Taking advantage of the superstitions which even yet are associated with the raven, the poet Poe has produced a poem to which this bird gives title, and which, by its spectral images, produces a striking effect on the imagination:

"Open here I flung my shutter,
When, with many a flirt and flutter,
In there stepp'd a stately raven
Of the saintly days of yore:
Not the least obeisance made he,
Not an instant stopp'd or staid he,
But, with mien of lord or lady,
Perched above my chamber door—
Perched upon a bust of Pallas,
Just above my chamber door;
Perched and sat, and nothing more.

"Then this ebon bird beguiling
My sad fancy into smiling,
By the grim and stern decorum
Of the countenance it wore:
'Though thy crest be shorn and shaven,
Thou'—I said—'art sure no craven,
Ghastly, grim, and ancient raven,
Wandering from the nightly shore—
Tell me what thy lordly name is,
On the night's Plutonian shore?'—
Quoth the raven, 'Nevermore!'

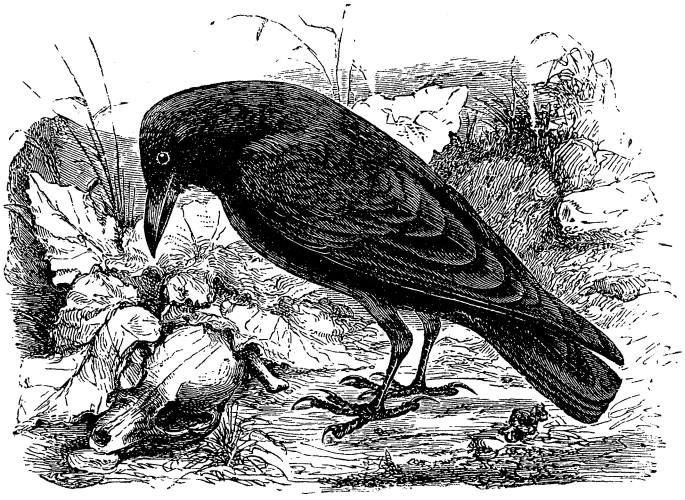
* * * *

"'Be that word our sign of parting,
Bird or fiend,' I shrieked upstarting;
'Get thee back into the tempest,
And the night's Plutonian shore!
Leave no black plume as a token
Of that lie thy soul hath spoken—
Leave my loneliness unbroken,
Quit the bust above my door;
Take thy beak from out my heart,
And take thy form from off my door'—
Quoth the raven, 'Nevermore!'"

There is perhaps no bird more widely distributed over the surface of the globe than the raven. A British writer says it "croaks as gravely as with ourselves on the shores of the Black and Cas-

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pian Seas, visits our Indian metropolis of Calcutta, forces its way over the guarded shores of Japan, dwells among our busy descendants of America, ranges from Mount Etna to the Iceland cold of Hecla, and braves the rigor of the arctic regions as far as Melville's Island." Captain Ross speaks of it as "one of the few birds capable of braving the severity of an arctic winter;" and Dr. Richardson says that "it frequents the Barren Grounds of the most intense winter cold, its movements being directed in a great measure by those of the herds of reindeer, musk-oxen, and bisons, which it follows, ready to assist in devouring such as are killed by beasts of prey or by accident. No sooner has a hunter slaughtered an animal than these birds are seen coming from various quarters to feast on the offal; and considerable numbers constantly attend the fishing stations, where they show equal boldness and rapacity." The raven is rarely seen in the Eastern States, but is common in the West, and especially in the vicinity of Niagara, and thence northward to the Fur Countries.



THE CARRION-CROW OF EUROPE.

The CARRION-CROW OF EUROPE, *C. Corone*—*Corneille Noire* of the French—in England passes under the various names of *Flesh-Crow*, *Gor-Crow*, *Black Crow*, *Corby-Crow*, and *Hoody*. It is eighteen inches long, its plumage black and highly glossed, with purple reflections above and green beneath. It is naturally intelligent, and living in the vicinity of man becomes exceedingly wary; it readily distinguishes between a man with a gun in his hand, and from whom it flies in fear and terror, and a man on horseback, whom it permits to approach more nearly without signs of alarm. It inhabits at all seasons Germany, France, Spain, Great Britain, and Italy. Temminck says it is a native of Japan. It lives in pairs all the year, and seldom more than two are found together, unless at a feast of carrion. Its partiality to animal food, even though it be in a putrid state, has given it several of its popular names. It attacks lambs and small quadrupeds, as well as young birds; it also eats shell-fish on the sea-shore. In default of meat it eats grain, potatoes, and has been known to feed on green walnuts. It is an early breeder, and commences building its nest in February. The female lays four or five eggs of a pale bluish-green, spotted and speckled with two shades of ash-color and clove-brown. Its voice is harsh, but in captivity it becomes tame and familiar, and shows a great deal of amusing cunning. The following ballad is descriptive of some of the more remarkable characteristics of this bird:

"The Carrion Crow is a sexton bold,
He raketh the dead from out the mould;
He delveth the ground like a miser old,
Stealthily hiding his store of gold.
Caw! caw!

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"The Carrion-Crow hath a coat of black,
Silky and sleek like a priest's, on his back;
Like a lawyer he grubbeth—no matter what way—
The fouler the offal the richer his prey.
Caw! caw! the Carrion-Crow!
Dig! dig! in the ground below!

"The Carrion-Crow hath a dainty maw,
With savory pickings he crammeth his craw;
Kept meat from the gibbet it pleaseth his whim,
It never can *hang* too long for him.
Caw! caw!

"The Carrion-Crow smelleth powder, 'tis said,
Like a soldier escheweth the taste of cold lead;
No jester in mime hath more marvelous wit,
For wherever he lighteth he maketh a hit.
Caw! caw! the Carrion-Crow!
Dig! dig! in the ground below!"

The American Crow, *C. Americanus*, is somewhat smaller than the preceding; it differs from that species also in having a more sonorous voice, and in being gregarious in its habits. In color, form, and food it is similar. Its length is seventeen inches; its color a shiny, glossy blue-black; the color of the female is somewhat duller; the food consists of grains, insects, carrion, frogs, tadpoles, lizards, small fish and shell-fish. Wilson says: "This is perhaps the most generally known, and least beloved, of all our land birds; having neither melody of song, nor beauty of plumage, nor excellence of flesh, nor civility of manners to recommend him; on the contrary, he is branded as a thief and a plunderer—a kind of black-coated vagabond, who hovers over the fields of the industrious, fattening on their labors, and, by his voracity, often blasting their expectations. Hated as he is by the farmer, watched and persecuted by almost every bearer of a gun, who all triumph in his destruction, had not heaven bestowed on him intelligence and sagacity far beyond common, there is reason to believe that the whole tribe would long ago have ceased to exist. It is a constant attendant on agriculture, and a general inhabitant of the cultivated parts of North America. In the interior of the forest he is more rare, unless during the season of breeding. He is particularly attached to low, flat corn countries lying in the neighborhood of the sea or of large rivers; and is more numerous in the Northern than Southern States, where vultures abound, with whom the crows are unable to contend. About the middle of March they pair, and soon begin to build, generally choosing a high tree; their nests are formed externally of sticks, wet moss, thin bark, mixed with mossy earth, and lined with large quantities of horse-hair, to the amount of more than half a pound, some cow-hair, and some wool, forming a very soft and elastic bed. The eggs are four, of a pale green color, marked with numerous specks and blotches of olive. During this interesting season the male is extremely watchful, making frequent excursions of half a mile or so in circuit to reconnoiter; and the instant he observes a person approaching, he gives the alarm, when both male and female retire to a distance till the intruder has gone past. He also regularly carries food to his mate while she is sitting, occasionally relieves her, and, when she returns, again resigns up his post. At this time, also, as well as until the young are able to fly, they preserve uncommon silence, that their retreat may not be suspected.

"It is in the month of May, and until the middle of June, that the crow is most destructive to the corn-fields, digging up the newly planted grains of maize, pulling up by the roots those that have begun to vegetate, and thus frequently obliging the farmer to replant, or lose the benefit of the soil; and this sometimes twice, and even three times, occasioning a considerable additional expense, and inequality of harvest. No mercy is now shown him. The myriads of worms, moles, mice, caterpillars, grubs, and beetles, which he has destroyed, are altogether overlooked on these occasions. Detected in robbing the hens' nests, pulling up the corn, and killing the young chickens, he is considered as an outlaw, and sentenced to destruction. But the great difficulty is, how to put this sentence in execution. In vain the gunner skulks along the hedges and fences; his faithful sentinels, planted on some commanding point, raise the alarm, and disappoint vengeance

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of its object. The coast again clear, he returns once more in silence, to finish the repast he had begun. Sometimes he approaches the farm-house by stealth, in search of young chickens, which he is in the habit of snatching off, when he can elude the vigilance of the mother hen, who often proves too formidable for him.

"So universal is the hatred to crows, that few states, either here or in Europe, have neglected to offer rewards for their destruction. In the United States they have been repeatedly ranked in our laws with the wolves, the panthers, foxes, and squirrels, and a proportionable premium offered for their heads, to be paid by any justice of the peace to whom they are delivered. On all these accounts, various modes have been invented for capturing them. They have been taken in clap-nets, commonly used for taking pigeons, two or three live crows being previously procured as decoys, or, as they are called, *stool-crows*. Corn has been steeped in a strong decoction of hellebore, which, when eaten by them, produces a giddiness, and finally, it is said, death. Pieces of paper formed into the shape of a hollow cone, besmeared within with bird-lime, and a grain or two of corn dropped on the bottom, have also been adopted. Numbers of these being placed on the ground, where corn has been planted, the crows attempting to reach the grains are instantly hoodwinked, fly directly upward to a great height, but generally descend near the spot whence they rose, and are easily taken. The reeds of their roosting places are sometimes set on fire during a dark night, and the gunners having previously posted themselves around, the crows rise in great uproar, and amid the general consternation, by the light of the burnings, hundreds of them are shot down.

"Crows have been employed to catch crows by the following stratagem: a live crow is pinned by the wings down to the ground on his back by means of two sharp, forked sticks. Thus situated, his cries are loud and incessant, particularly if any other crows are within view. These, sweeping down about him, are instantly grappled by the prostrate prisoner, by the same instinctive impulse that urges a drowning person to grasp at every thing within his reach. Having disengaged the game from his clutches, the trap is again ready for another experiment; and by pinning down each captive successively, as soon as taken, in a short time you will probably have a large flock screaming above you, in concert with the outrageous prisoners below.* Many farmers, however, are content with hanging up the skins or dead carcasses of crows in their corn-fields, *in terrorem;* others depend altogether on the gun, keeping one of their people supplied with ammunition, and constantly on the look-out. In hard winters the crows suffer severely, so that they have been observed to fall down in the fields, and the roads, exhausted with cold and hunger. In one of these winters, and during a long-continued, deep snow, more than six hundred crows were shot on the carcass of a dead horse, which was placed at a proper distance from the stable, from a hole of which the discharges were made. The premiums awarded for these, with the price paid for the quills, produced nearly as much as the original value of the horse, besides, as the man himself assured me, saving feathers sufficient for filling a bed.

"The crow is easily raised and domesticated, and it is only when thus rendered unsuspicious of, and placed on terms of familiarity with man, that the true traits of his genius and native disposition fully develop themselves. In this state he soon learns to distinguish all the members of the family; flies toward the gate screaming at the approach of a stranger; learns to open the door by alighting on the latch; attends regularly at the stated hours of dinner and breakfast, which he appears punctually to recollect; is extremely noisy and loquacious; imitates the sounds of various words pretty distinctly; is a great thief and hoarder of curiosities, hiding in holes, corners, and crevices every loose article he can carry off, particularly small pieces of metal, corn, bread, and food of all kinds; is fond of the society of his master, and will know him even after a long absence, of which the following is a remarkable instance, and may be relied on as a fact: a very worthy gentleman, who resided on the Delaware, a few miles below Easton, had raised a

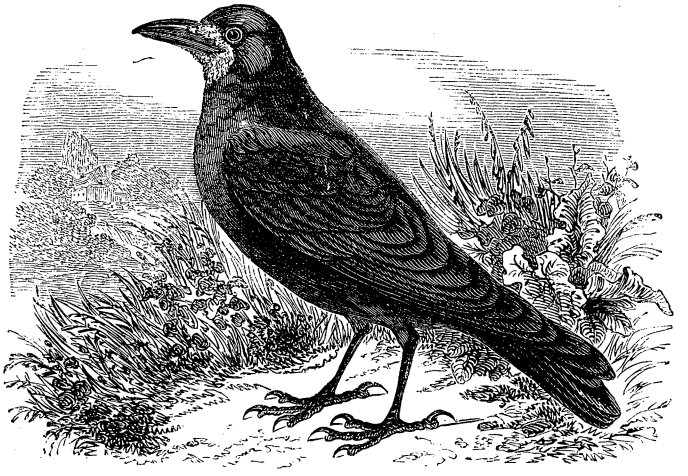
* In New England *scare-crows* in the form of ragged, beggarly men are generally adopted to save the recently planted corn from the crows and blackbirds, many of these specimens of art displaying considerable humor; sometimes a windmill with a clapper is set in the field; shingles and pieces of tin suspended by a twine, and whirling in the wind, are common. But the cheapest and best defence of the corn-field is no doubt a series of lines of twine strung across the field. A kind of twine for this express purpose is manufactured and sold in the country stores.

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crow, with whose tricks and society he used frequently to amuse himself. This crow lived long in the family, but at length disappeared, having, as was then supposed, been shot by some vagrant gunner, or destroyed by accident. About eleven months after this, as the gentleman one morning, in company with several others, was standing on the river-shore, a number of crows happening to pass by, one of them left the flock, and flying directly toward the company, alighted on the gentleman's shoulder, and began to gabble away with great volubility, as one long absent friend naturally enough does on meeting with another. On recovering from his surprise, the gentleman instantly recognized his old acquaintance, and endeavored, by several civil but sly maneuvers, to lay hold of him; but the crow, not altogether relishing quite so much familiarity, having now had a taste of the sweets of liberty, cautiously eluded all his attempts, and suddenly glancing his eye on his distant companions, mounted in the air after them, soon overtook and mingled with them, and was never afterward seen to return."

The Fish-Crow, *C. ossifragus*, is sixteen inches long, black, builds on tall trees; eggs four or five. It haunts the borders of rivers and sea-coasts, and feeds on dead as well as living fish, water-lizards, &c.; it is found often in flocks along the sea-shore from Georgia to New Jersey, and breeds in the latter state. It is less suspicious than other crows, and sometimes becomes familiar near the farms, hopping up on the backs of cattle to feed on the parasitic insects. It attends on the fisheries of New Jersey and the shad-fisheries of the Delaware to devour the offal. It is often confounded with the common crow, but may be distinguished on examination, as it is somewhat smaller, and has the chin naked. Other American species of crow are the White-necked Crow, *C. cryptoleucus*, of the country of the Rio Grande and Gila; and the Northwestern Fish-Crow, *C. caurinus*, of Washington Territory.

The Hooded Crow, *C. cornix—Corbeau mantelé* of the French, and called in England by the various names of the *Royston-Crow*, *Gray-backed Crow*, *Dun Crow*, *Bunting-Crow*, and *Hoody-Crow*—resembles the preceding in character and habits, though it is said to be more mischievous. It is twenty inches long; the general color shiny black; nape of the neck, back, rump, and under surface of the body a smoke-gray. Its voice is more shrill than that of the common crow, but it lives on the same food, except when near the sea it devours sand-worms, shell-fish, and other marine productions. It is exceedingly intelligent, and when it wishes to break a cockle or mussel shell, it will soar into the air and drop it on a rock, and thus get at the flesh. Many other curious instances of the sagacity of this bird are related. It is found all over Europe, and in some places is very numerous. Sometimes common crows are seen mingled with them; indeed, these two species are said occasionally to breed together, but whether the hybrid product is prolific is not determined.

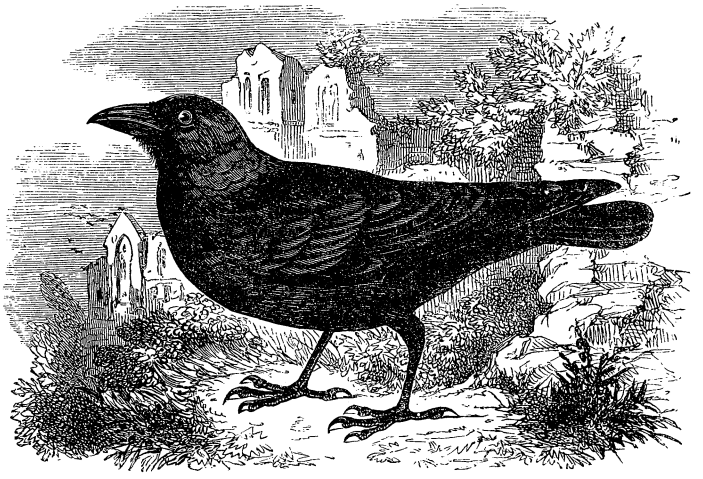


THE ROOK.

The Rook, *C. frugilegus*, is nineteen inches long, and greatly resembles the common crow, the whole plumage being black, glossed with purple; white, pied, and cream-colored varieties some-

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times occur. It feeds on insects and worms, and is supposed to be very beneficial to the farmers by the immense number of noxious creatures which it thus destroys. It constructs its nests in high trees, and often hundreds, and indeed thousands, build in the same wood, constituting what is called a *Rookery*. This is usually placed near human habitations, and indeed these birds often breed in trees in large cities. A few years since a pair of them built between the wings of the dragon on Bow Church, London; others have built in Manchester, Newcastle, &c. They are diffused over a great part of Europe, and are very abundant in England and Ireland; we often see them referred to in English books. Their intelligence is remarkable; when tamed they become attached to their keeper, and perform many amusing tricks.



THE JACKDAW.

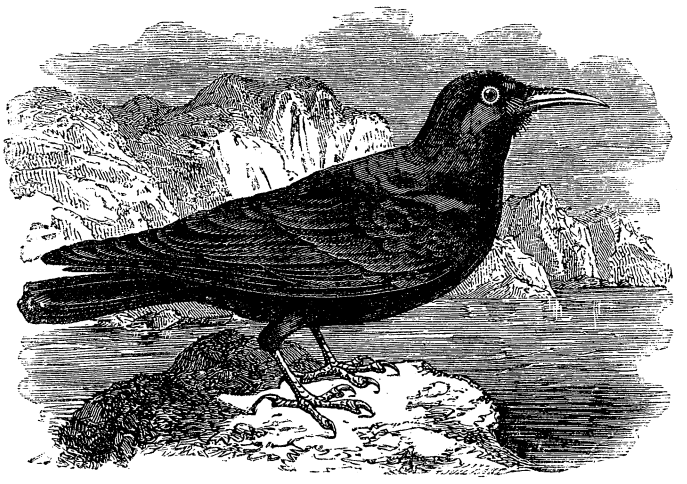
The JACKDAW, *C. monedula*—the *Choucas* of Temminck; *Corneille des Clochers* of the French—is fourteen inches long; color black; smoke-gray on the neck; eggs four to six; the nests are made in church-towers, belfries, steeples, and hollow trees and rabbit-burrows; many of them build in the higher parts of Windsor Castle, and in the churches of large towns in England; flocks are constantly seen in Paris, frequenting the trees in the garden of the Tuileries, and nestling in the churches and public buildings. They are a sociable, cheerful, and active race, flying about from place to place, and filling the air with their cries, which resemble the notes of young crows. They eat indiscriminately insects, seeds, grain, eggs, carrion, fish, shell-fish, and soft garden vegetables. They are said to pair for life. They are cunning birds, have a turn for imitation, and in confinement learn to speak some words. They are distributed throughout Europe and Northern Asia, and are not migratory.

Genus FREGILUS: *Fregilus.*—This includes the CHOUGH or RED-LEGGED CROW, *F. graculus* of Cuvier, sixteen inches long; color black, glossed with blue; feeds on insects, berries and grain; builds its nest of sticks, lined with wool, in the cavities of cliffs, old castles, and church-towers near the sea. It inhabits the high rocky regions of Middle Europe and Asia, frequents the cliffs of Great Britain along the British Channel, and being common in the mountains of Cornwall, is often called the *Cornish Chough*. It is intelligent, and when domesticated is an exceedingly amusing creature.

Genus PYRRHOCORAX: *Pyrrhocorax.*—This includes the ALPINE CHOUGH, *Chocard* of the French, *P. Alpinus*, fifteen inches long; black, with green reflections; lives in troops in the mountains of Central Europe in summer, and descends to the valleys in winter; habits like the preceding.

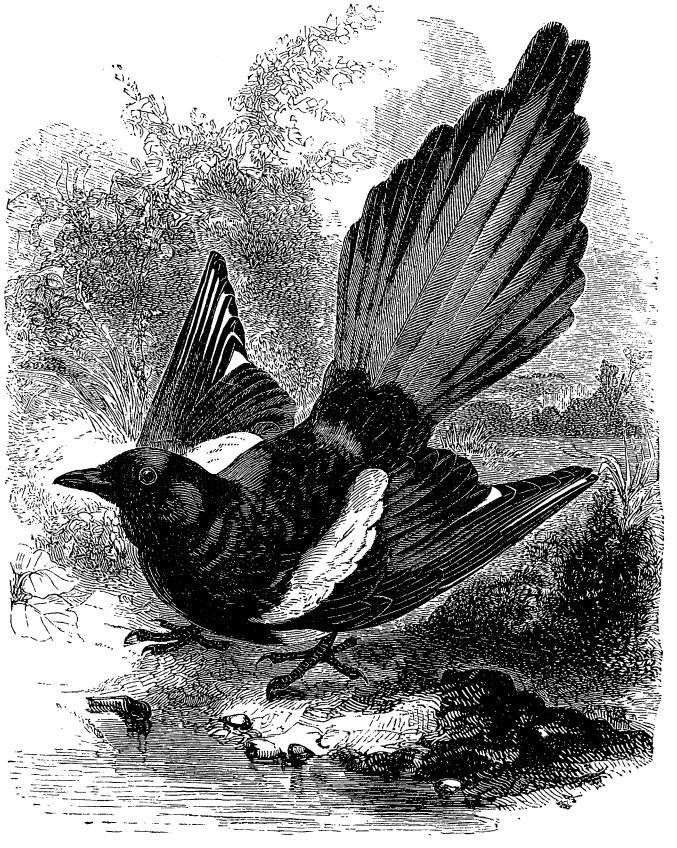
Genus PICA: *Pica.*—This includes the MAGPIE—*Gazza* of the Italians, *Pie* of the French, and *Elster* of the Germans—*P. caudata*, eighteen inches long; the head, neck, back, and upper tail coverts jet black; throat grayish-white; scapulars pure white; wing-coverts and tertials of a

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THE CHOUGH. (See p. 202.)

fine shiny blue; it builds its nest in a high tree or a lofty hedge, formed on the outside of sharp, thorny sticks, within of fibrous roots and dry grass; the top is covered, with an entrance at the side; the eggs are six or seven. It is a beautiful bird, but its character is bad. Its habits are sus-



THE MAGPIE.

picious, and though seeking the habitations of man, it is always prompted by self-interest. "It is," says Montagu, "a great enemy to the husbandman and the preserver of game, but has cunning

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enough to evade their wrath. No animal food comes amiss to its carnivorous appetite; young poultry, eggs, young lambs, and even weakly sheep it will attempt to destroy, by first plucking out their eyes; the young of hares, rabbits, and feathered game share the same fate; fish, carrion, insects, fruit, and lastly grain, when nothing else can be got. It is an artful, noisy bird, proclaiming aloud any apparent danger, and thereby giving notice to its associates. Neither the fox nor other wild animal can appear without being observed and haunted; even the fowler is frequently spoiled of his sport, for all other birds seem to know the alarming chatter of the magpie." This bird is easily tamed, and chatters to those who feed him, imitates human voices, and performs many amusing tricks. Like many of the crow family, it has a strange desire to pilfer and secrete small shining objects, especially pieces of money, and in this way is extremely mischievous when allowed to go about the house. The affecting story of the "Magpie and the Maid," in which the latter was charged with theft, while the magpie was the culprit, is founded on fact, and is familiar to all.



THE PARADISE PIE.

This species is found throughout Europe, and is constantly seen in the meadows and fields of England, France, Germany, and Italy. It is also abundant in this country, though it is confined to the western regions—that is, from Texas, northward through Louisiana, Arkansas, Missouri, and the British territories to latitude 58°. Some naturalists have supposed it must be a distinct species, as by a strange instinct it remains fixed in the unsettled territories of the West, while in Europe it seems to haunt the abodes of man. It has, however, the same size, markings, structure, and habits as the foreign magpie, and is therefore supposed to be of the same species. Travelers in the West are sometimes very much annoyed with them, as they will often penetrate their tents and snatch the meat from the dishes; and if a horse chance to have a sore back, they will descend upon it, and attempt to make a meal of the living flesh.

There is another species of this bird, the YELLOW-BELLIED MAGPIE, *P. Nuttalli*, in California: in the eastern hemisphere there are several closely allied to it, among which is the *Dendrocitta vagabunda*, common in India; and the *Picathartes gymnocephalus*, of Africa, which has the neck bare of feathers, and somewhat resembles the vultures in appearance and habits.

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Genus ASTRAPIA: *Astrapia*, includes the PIE OF PARADISE, or *Incomparable* of the French, *A. gularis*, a rare species of New Guinea. An idea of its form may be gathered from the preceding engraving, but no conception of the brilliancy of its metallic tints, and the varying play of the light upon the plumage, can be afforded by description.



THE SUPERB BIRD OF PARADISE. THE EMERALD BIRD OF PARADISE.

PARADISEIDÆ OR BIRDS OF PARADISE.

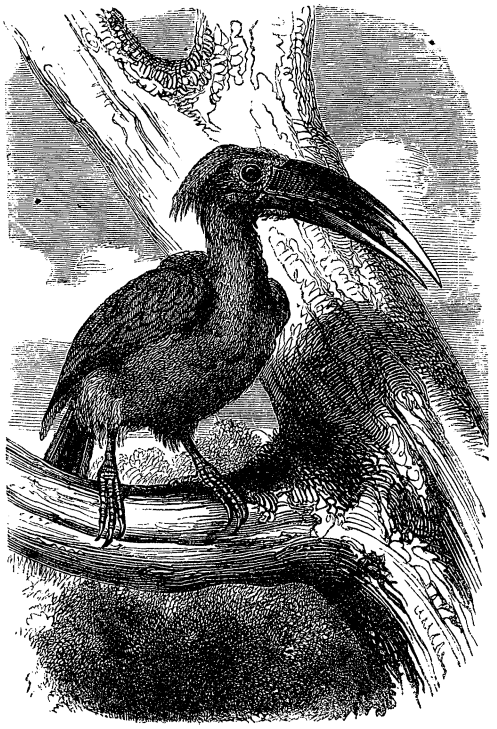
This group, which, notwithstanding their brilliancy and the renown which clusters around them, are nearly allied to the Corvidæ, belonging to New Guinea and the adjacent islands: here they live in troops in the dense forests, one male surrounded by some fifteen females. The GREAT EMERALD BIRD OF PARADISE, *Paradisea apoda*, is remarkable for the large bunches of decomposed plumes which issue from the body, and float gracefully in the air, and which are so much coveted by the ladies of Europe and America as ornaments for head-dresses. In the SUPERB BIRD OF PARADISE, *P. superba*, the feathers rise in wing-like tufts upon the back and neck, giving it an aspect of gorgeous beauty and brilliancy. There are several other species, some of them plain, but the greater part distinguished by these tufts of light, rich, floating plumes. It is to be understood, however, that these ornaments belong exclusively to the males. Formerly these birds were said to live wholly in the air, and hence there was the interest of the marvelous added to that of their surpassing beauty. They are now known to live and nestle in the forests, and to feed on fruits and seeds. The feathers are not only valued in commerce, but they are used as decorations of the turbans of the chiefs of the islands where they are found

THE BUCERIDÆ OR HORNBILLS.

The Hornbills are mostly of tolerably large size, some of them being of the stature of a small turkey. Their general color is usually a greenish metallic-black, with the tail-coverts and the tail white, or of some other light color; the tail generally has a black transverse band near the extremity. They are inhabitants of the hottest parts of the Old World, and especially of the islands of the Eastern Archipelago and Africa. Their food consists of fruits, and according to some naturalists, also of carrion and small animals, the latter of which they are said to squeeze to death in their enormous bills, and then, throwing them up in the air, catch them and swallow them whole. Lesson states that the African species live on carrion, and those of the East Indies on

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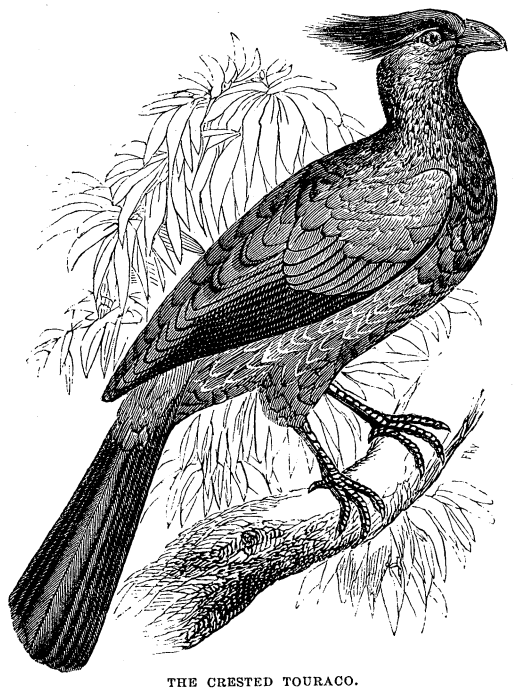
fruits, and especially on nutmegs, from which, he says, their flesh acquires a delicious flavor. They are found in the dense forests and jungles, where they sit upon the highest branches of the trees, often in large troops; their nesting places are the holes of trees, which, like the parrots and toucans, they enlarge for the purpose of nidification; the female lays four eggs. Their flight is effected by a very rapid motion of the wings, which produces a considerable noise; this is accompanied by a continual clattering of their mandibles, so that the passage of a flight of hornbills causes a sound which is said to be productive of very uncomfortable sensations when its origin is unknown, as it bears a good deal of resemblance to one of those sudden, violent winds which often rise unexpectedly in the tropics.



THE CROWNED TOCK.

There are several species: the Crowned Tock, *Buceros coronatus*, is African, with an enormous red bill; the body smoke-color above and whitish below. Levaillant saw flocks of five hundred of these, with crows and vultures, feeding on the remains of one elephant. The *B. cavatus* is of the Himalaya Mountains; the body is of white and blackish-gray; bill large, hooked, and having a sort of casque above the beak, which appears heavy, but is light, frail, and easily crushed.

The Rhinoceros Hornbill, *B. Rhinoceros*, is four feet long, including the bill, which is a foot long: it is found in India. There are still other species.



THE CRESTED TOURACO.

THE MUSOPHAGIDÆ OR PLANTAIN-EATERS.

These are African birds, and comprise several genera; among them are the Touracos, which are very elegant birds, feeding on soft fruits; the prevailing colors are brilliant green. The Crested Touraco, *Chizærhis variegata*, is twenty inches long; light gray above; under plumage white; crest far back on the head. Other species are the *Corythaix Senegalensis*, *C. erythrolophus*, *Musophaga violacea*, &c.

THE OPISTHOCOMIDÆ OR HOATZINS.

These birds, of which there is but a single species, the Hoatzin, *Opisthocomus cristatus*, are closely allied to the preceding; they live in large flocks on the banks of rivers and creeks in Brazil and Guiana; they are nearly as large as peacocks, and are similar in shape, with a tall crest of narrow feathers on the head. The bill is thick, short, convex, and bent down at the tip; it feeds on the leaves of a particular tree—the *Arum arborescens;* it lays three to four eggs,

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THE CONCAVE HORNBILL: BUCEROS CAVATUS.

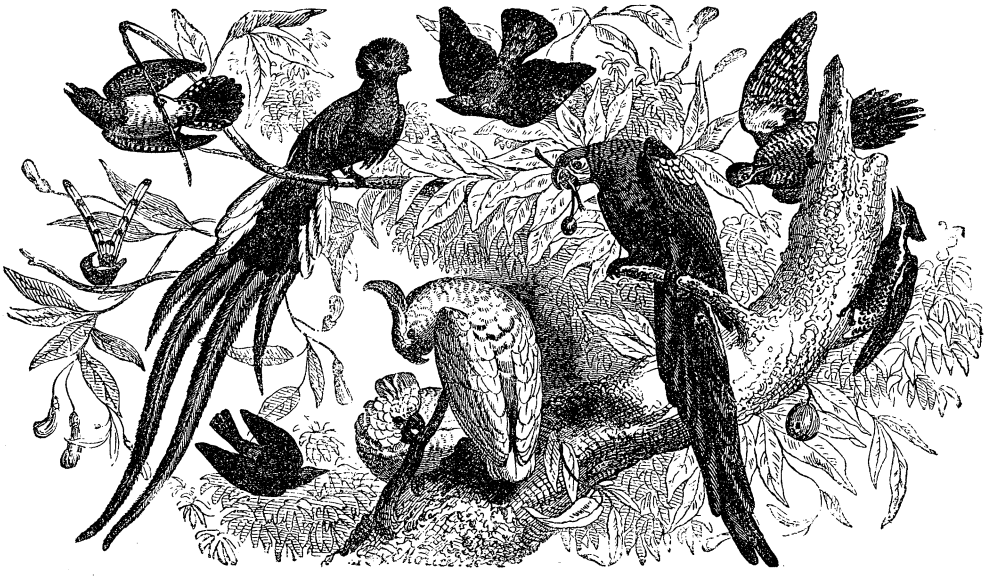
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dirty white, red spotted; the flesh is tainted with a strong odor of castoreum, and is therefore unfit for food.

THE COLIIDÆ OR COLIES.

These birds are allied to the *Musophagidæ;* their feathers are soft and silky, and their color greenish-gray, whence they are called *Mouse-Birds;* they belong to both Africa and Asia; they are gregarious, live upon fruits and buds, and are the scourge of gardens. They walk badly, but climb like parrots; they sleep suspended from the branches of trees, with their heads downward; the eggs are five to six; the flesh is esteemed for the table.



ORDER 3. **SCANSORES.**

The principal character by which these birds are distinguished from the Passeres, consists in the peculiar arrangement of the toes, of which two are always directed forward and two backward. This enables them to climb trees with great facility, some of them, as the Parrots, by grasping the smaller branches, and using the feet in the manner of hands, while others, such as the Woodpeckers and their allies, may rather be considered to run upon the surface of the trunks and larger branches in every direction. Some live principally upon fruits and seeds, others upon insects. In most cases, the wings are rather short, and the flight by no means vigorous. The order includes four families—the *Cuckoos*, the *Woodpeckers*, the *Parrots*, and the *Toucans*.

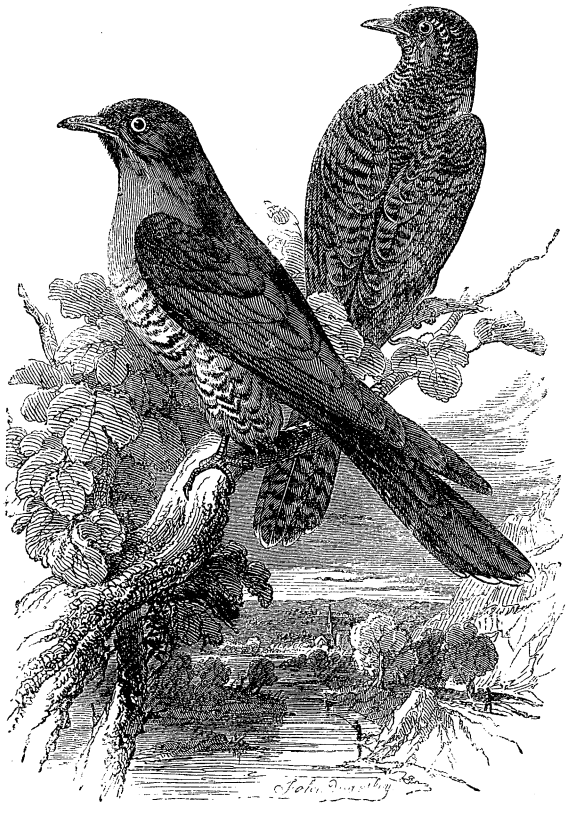
THE CUCULIDÆ OR CUCKOOS.

The prominent genus of this family is CUCULUS: *Cuculus*, which includes the Common Cuckoo of Europe, *C. canorus*, fourteen inches long, of a gray tint, the breast barred with brownish-black; it is migratory, arriving in Europe in the spring, uttering very distinctly, and in a tender and plaintive tone, the notes *cuck-oo, cuck-oo*, very different from the flat notes of *kou-kou* belonging to our cuckoo. It feeds principally on the large hairy caterpillars of the tiger-moths; it also eats other insects, worms, &c. It builds no nest, but the female deposits her egg, stealthily, in the nest of some other bird—a titlark, thrush, wagtail, robin, sky-lark, or bunting, and it is hatched by the deceived and cheated proprietor with her own brood. The young cuckoo, when he is partly grown, crowds himself under his young foster-brothers and sisters, lifts them up, and tumbles them over the edge of the nest to the ground; here they perish, while he gormandizes all the food the parents can bring. This is not an occasional or accidental proceeding on the part of the cuckoos; it is instinctive, systematic, and universal. What a strange departure from the usual course of nature; fraud, cruelty, and ingratitude in the very cradle of a whole race of birds!

The Great Spotted Cuckoo, *C. glandarius*, is fifteen and a half inches long; it belongs to

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Northern Africa, but migrates in summer into Southern Europe; it deposits its eggs in the nests of other birds, like the preceding; it even dupes the hooded crow, one of the most cunning of birds, so that it hatches and brings up the young cuckoos with the greatest care, never suspecting the cheat that has been practiced!



THE EUROPEAN CUCKOO.

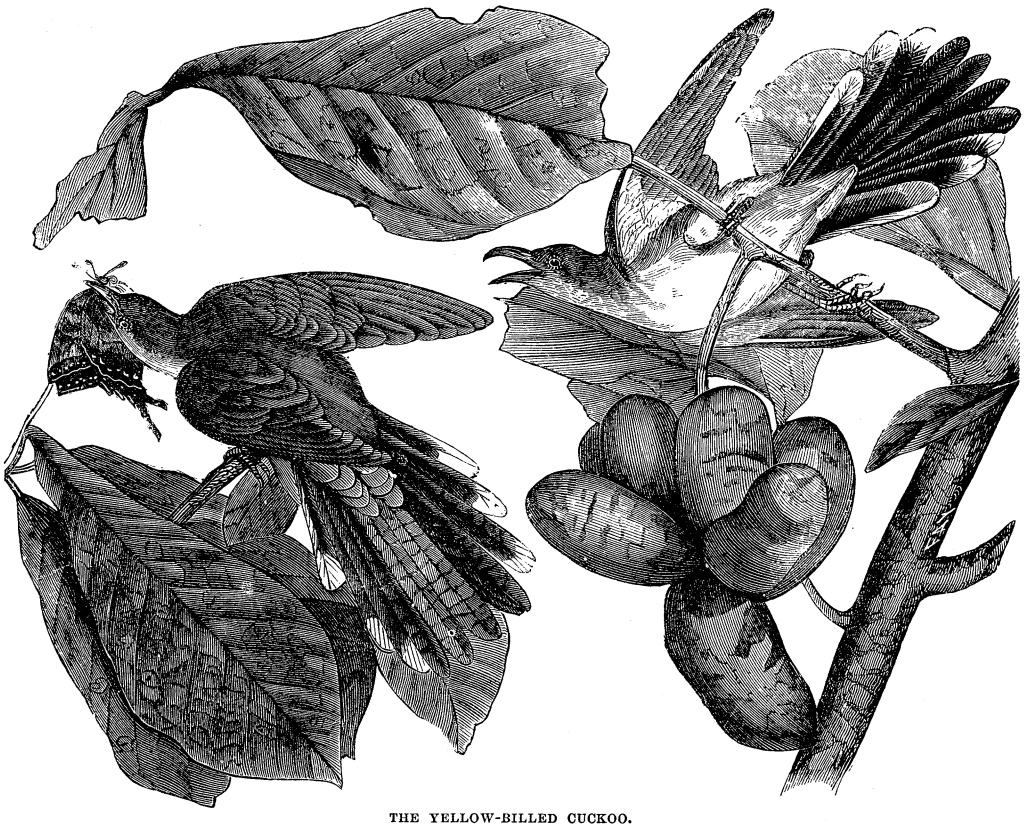
The *Crotophaginæ* is a group of birds inhabiting tropical countries, and feeding on insects and fruits. The typical genus, CROTOPHAGA, belongs to South America and the West Indies, though two species, the *C. rugirostris* and *C. Ani*, are found within the southern boundaries of the United States. They are somewhat parrot-like birds, about twelve inches long, live in bands in the borders of woods, especially in swampy places, and subsist on insects, larvæ, small reptiles, and certain fruits and seeds. It is said that several females lay in one nest, where they hatch and bring up the young together, a system of socialism in curious contrast to the selfish isolation of the true cuckoos. Another species, the CHANNEL-BILL, *Scythrops Novæ Hollandiæ*, is the size of the crow, with a very long tail; it feeds on insects and fruits; found in Australia and the Asiatic Islands.



THE GREAT SPOTTED CUCKOO.

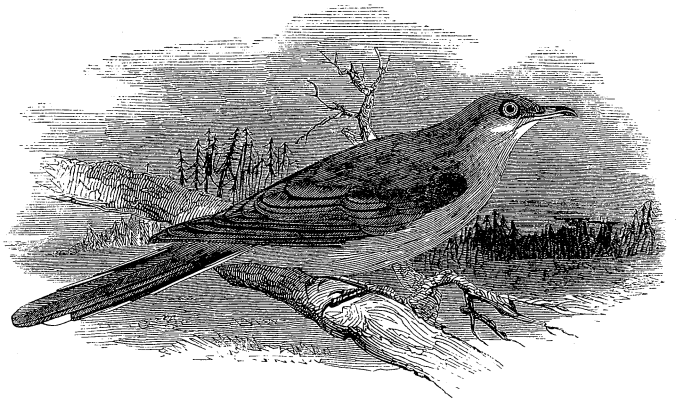
Genus COCCYZUS: *Coccyzus*.—To this belongs the COMMON AMERICAN CUCKOO, *C. Americanus*, often called the *Yellow-billed Cuckoo*. It is twelve inches long, of a very slender form; grayish-brown above, with greenish reflections; below whitish; its food consists chiefly of hairy caterpillars, cockchafers, and the eggs of small birds. It is found from the Eastern United States, to the Missouri plains. It is migratory, appearing among us in May, but seldom passing farther north than Massachusetts; it is shy, and seeks concealment in the thick foliage of the trees. It pairs, and displays great conjugal fidelity; it hatches several broods in a season, and often has birds of several ages in the same nest. It is said to be a bad nest-maker, and an improvident nurse. It seems that something of that defect of character which so debases the European cuckoo, attaches

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THE YELLOW-BILLED CUCKOO.

to this, for it often leaves its young to be reared by other birds. The eggs are two to four, and of a bluish-green color, usually very pale. It has a frequent cry of *kou, kou, kou*, whence it is called *Cow-Bird;* as these notes are supposed to be uttered most frequently before a storm, it is also called *Rain-Crow.* It is a curious fact that no less than four specimens of this bird have been seen in England, where it is not indigenous; it is supposed they must have migrated across the Atlantic.



THE BLACK-BILLED CUCKOO.

The Black-billed Cuckoo, *C. erythrophthalmus*, is twelve and a half inches long, and resembles the preceding in appearance and habits; it is also distributed through the same regions. It is less shy, however, and its note is something like *worrattotoo;* the eggs, three to five, are a bluish-green. This is the *St. Domingo Cuckoo* of Nuttall.

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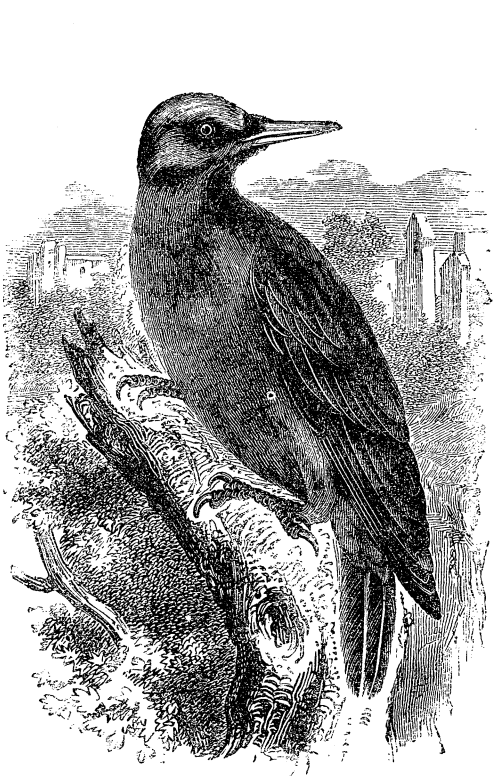
These United States species of cuckoo are common in Mexico and South America; in these regions there are several other species: among them is the MANGROVE CUCKOO, *C. seniculus*, or *C. minor*, an inhabitant of Cayenne, but often visiting the Southern States.

The *Saurotherinæ* or *Ground-Cuckoos* inhabit tropical America, live much on the ground or in low bushes, and feed on insects, worms, and seeds. One species, the *Saurothera vetula*, inhabits the West Indies, and is fifteen inches long.

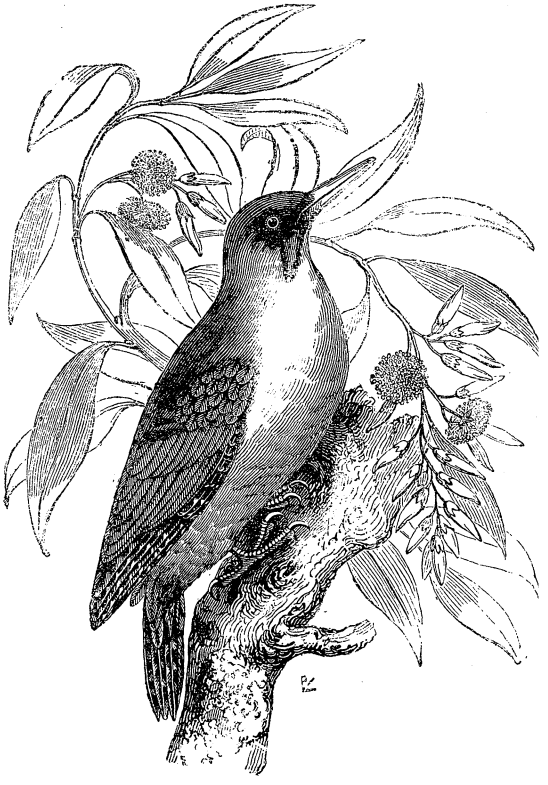
The CHAPARRAL-COCK, PRAIRIE-COCK, or PAISANO, *Geococcyx Mexicanus*, figured by Cassin, is about twenty inches long, the tail being eleven inches; the head has an erectile crest; found in California, New Mexico, Texas, and Mexico.

The genus CENTROPUS includes several species of what are called *Lark-heeled Cuckoos*, from their having the claw of the hind toe elongated, as in the larks; they are also called *Pheasant-Cuckoos*, from the great length of their tails. These are found in Africa, India, and the Asiatic Islands; they seek their food on the ground, and sometimes devour small reptiles.

The *Indicatorinæ* or *Honey-Guides* are a group of small birds of this family, inhabiting the forests of Africa, India, and Borneo. They are fond of honey, and when they discover a hive of wild bees stored with this, they flutter around it, and thus direct the honey-seekers to it. It was formerly said that it would guide them through the woods to the honey, but this is no doubt a fiction. The common species of Southern Africa, *Indicator major* and *minor*, construct bottle-shaped, pendent nests, with the opening downward.



THE GREAT BLACK WOODPECKER.



THE GREEN WOODPECKER.

THE PICIDÆ OR WOODPECKERS.

These are strong and vigorous birds, possessing a long, sharp bill, with which they bore into the bark of trees and the decayed parts of the limbs and trunks, in search of insects, as well as carve out holes for their nests. They live in forests, and run up and down the trees, often ascending in spiral lines, and continually tapping the surface, to discover the hiding-place of insects and

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larvæ. When they find such a spot they dig into it with great energy, and seize the concealed prize. In climbing they are assisted by the stiff points of their tail-feathers. Their tongue is extensile, and thus facilitates the capture of their insect prey. They feed also on fruits and seeds.

Genus PICUS: *Picus.*—This includes the GREAT BLACK WOODPECKER—*Pic Noir* of the French—*P. martius*, sixteen inches long; the body black above, somewhat duller beneath; a bright blood-red spot on the head. Its flight is short, usually limited to a transit from tree to tree; its nest is made in a hollow tree; the eggs are two or three, and ivory-white. On the wing it resembles a crow; its note is loud and harsh. It inhabits Northern Europe, being rare in the south.

The GREEN WOODPECKER, *P. viridis*—*Pic Vert* of the French; *Pico Verde* of the Italians; *Grün-Specht* of the Germans—is called in England by the various names of *Woodspite*, *Rain-Bird*, *Rain-Fowl*, *High-Hoe*, *Hewhole*, *Awl-Bird*, *Pick-a-Tree*, *Yappingale*, *Yaffil*, *Yaffle*, *Yaffler*, *Woodwall*, *Whet-Ile*, and *Popinjay*. It is thirteen inches long; the neck, back, wings, wing-coverts, and scapulars deep green, tinged with yellow; rump sulphur-yellow; under surface ash-green. It is a brilliant and beautiful bird; nestles and roosts in holes in trees, which it sometimes enlarges, or even wholly excavates, using its beak as chisel and hammer; the eggs are five to seven, laid on loose fragments of wood; its common note is a loud, harsh sound, which Buffon thought a doleful cry of misery, while others compare it to a vociferous laugh. It is said to be most merry before an impending shower, and hence is called *Rain-Bird*. It is found throughout Europe.



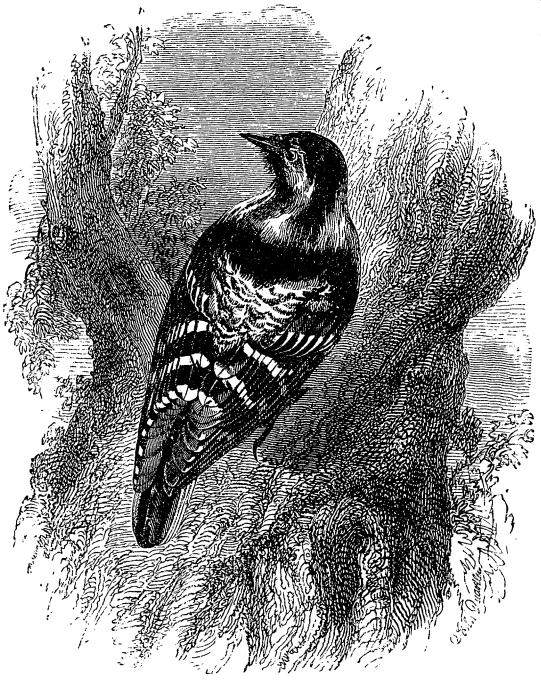
THE GREAT SPOTTED WOODPECKER.



THE MIDDLE SPOTTED WOODPECKER.

The GREAT SPOTTED WOODPECKER, *P. major*, is nine and a half inches long; found through out Europe. The LESSER SPOTTED WOODPECKER, *P. minor*—*Petit Pic* of the French, and *Gras-Specht* of the Germans—is five and three-quarter inches long; variously colored with white and black; lives in woods, orchards, and nursery-grounds; is distributed over Europe, and is common in England. The MIDDLE SPOTTED WOODPECKER, *P. medius*, is a lustrous black above; beneath crimson, and a red spot on the head; found in Southern Europe. The WHITE-BACKED WOODPECKER, *P. leuconotus*, is ten inches long, and inhabits the north of Europe and Siberia. The GRAY WOODPECKER, *P. canus*, feeds on ants, and inhabits Northern Europe. The THREE-TOED

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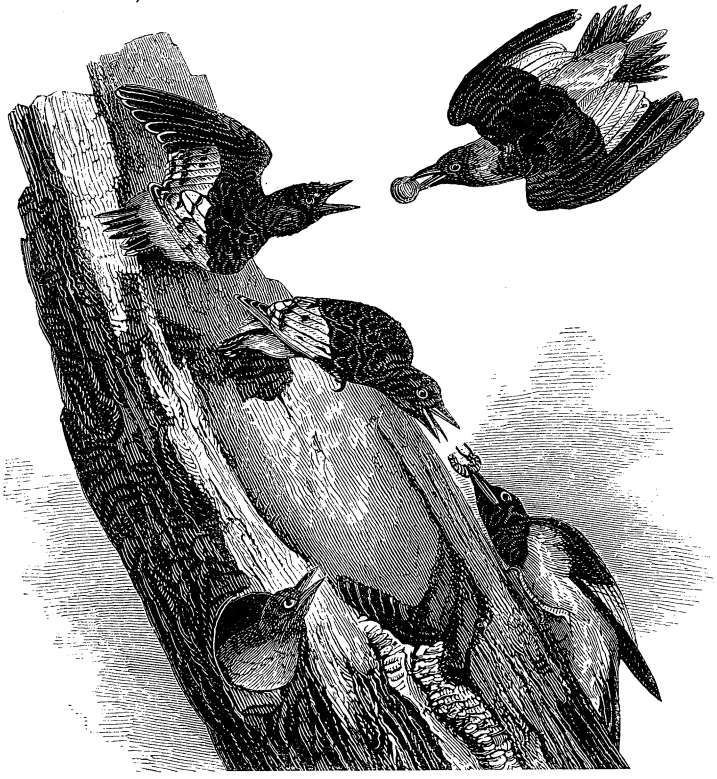


THE LESSER SPOTTED WOODPECKER.

Woodpecker, *P. tridactylus* or *P. arcticus*, is nine inches long, and inhabits the north of Europe, as well as North America, being sometimes found as far south as Pennsylvania.

Among the Asiatic species are the *P. Shorii*, *P. squamatus*, and *P. occipitalis*, all found in the Himalaya Mountains. The *P. Caffer* is found in Southern Africa.

There are about thirty species of woodpecker known in the United States, which have been divided by naturalists into several genera. Dr. De Kay, however, includes them in one—that of *Picus*. The most commonly known is the Red-headed Woodpecker, *P. erythrocephalus*, *Melanerpes erythrocephalus* of Linnæus, eight to nine inches long; head, neck, and throat crimson; back, wings, and tail black; secondaries, rump, and all beneath nearly white. It is chiefly a summer bird, though a few remain through the year; it feeds on juicy fruits, cherries, apples, pears, Indian corn in the milk, and insects which infest decayed trees. It makes its nest in holes in dry trees, which it excavates with its bill; the eggs are about six, and white, with reddish spots at the end; there are two broods in a



RED-HEADED WOODPECKERS.

season. This bird generally lives in the forests, but it often visits the orchards, and in cherry time

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is a constant visitor to the cherry-trees. For some unknown cause it is less abundant than formerly in the Eastern and Middle States.



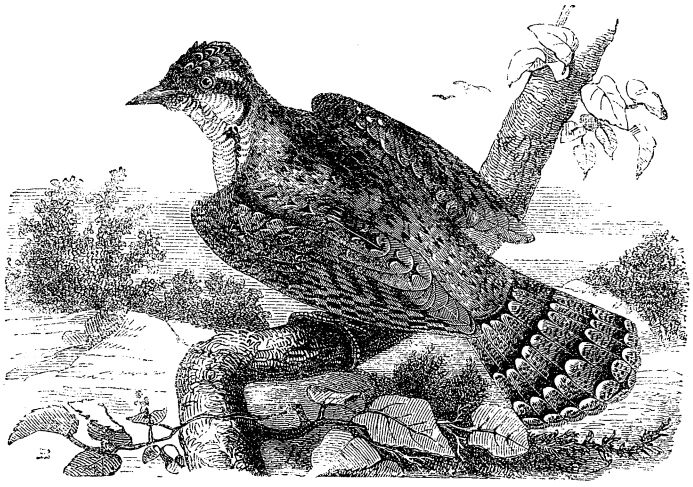
THE GOLDEN-WINGED WOODPECKER.

The GOLDEN-WINGED WOODPECKER, *P. auratus*—the *Colaptes auratus* of Swainson, is a splendid bird, twelve inches long; upper parts brown, spotted with black; a red spot on the head; under side of the wings salmon color; of the tail saffron; belly white, spotted with black; food, wood-lice, ants, larvæ, cherries, grapes, berries, corn in the milk, &c. They build their nests in holes in the trees, which they dig out with astonishing celerity; they have been known to excavate a winding passage through solid oak fifteen inches deep. When at work the strokes of their bill resound through the woods like the hammer of a carpenter. The eggs are about six, and pure white. When the brood take wing, they are exceedingly playful and noisy as they range from tree to tree in the forests or orchards. This bird goes by the various names of *Pigeon-Woodpecker*, *Wake-up*, *High-Hole*, *Flicker*, and *Yucker;* in New York it is called *Clape*, and by the French in Louisiana, *Pique-bois jaune*. Found in Eastern North America. Another and similar species is the RED-SHAFTED FLICKER, *Colaptes Mexicanus*, found in Western North America.

The CRESTED WOODPECKER, *P. pileatus*—*Hylatomus pileatus* of Linnæus—is eighteen inches long, and is sometimes called *Log-Cock* and *Wood-Cock* in New York; ranges from Mexico to 60° north. The IVORY-BILLED WOODPECKER, *P. principalis*—*Campephilus principalis* of Linnæus—is a powerful and splendid species, twenty inches long; found in the Carolinas and southward. Other species are as follows, according to the Museum Catalogue of the Smithsonian Institution: the IMPERIAL WOODPECKER, *Campephilus imperialis;* chiefly in Central America and Southwestern Mexico. The HAIRY WOODPECKER, *P. villosus*, Northern and Western Regions: three varieties of this—*major*, *medius*, *minor*. HARRIS'S WOODPECKER, *P. Harrisii*, from Pacific to eastern slope of Rocky Mountains. DOWNY WOODPECKER, *P. pubescens;* Eastern United States, toward the Rocky Mountains. GAIRDNER'S WOODPECKER, *P. Gairdneri;* from Pacific to eastern base of Rocky Mountains. NUTTALL'S WOODPECKER, *P. Nuttalli;* coast of California. *P. scalaris;* Rocky Mountains, south of 35°, to Yucatan. RED-COCKADED WOODPECKER, *P. borealis;* Southern States. WHITE-HEADED WOODPECKER, *P. albolarvatus;* Oregon and California. BLACK-BACKED THREE-TOED WOODPECKER, *Picoides Arcticus;* northern portions of United States, to the Arctic Regions. BANDED THREE-TOED WOODPECKER, *P. hirsutus;* Arctic Regions of North America. STRIPED THREE-TOED WOODPECKER, *P. dorsalis;* Rocky Mountains. YEL-

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LOW-BELLIED WOODPECKER, *Sphyrapicus varius;* Atlantic Ocean to Rocky Mountains, and in Greenland. RED-THROATED WOODPECKER, *S. nuchalis;* Rocky Mountains. RED-BREASTED WOODPECKER, *S. ruber;* Pacific slope of the United States. WILLIAMSON'S WOODPECKER, *S. Williamsonii;* Rocky Mountains. RED-BELLIED WOODPECKER, *Centurus Carolinus;* Northern America, from Atlantic to Rocky Mountains. YELLOW-BELLIED WOODPECKER, *C. flaviventris;* Rio Grande Region, in United States, and south into Mexico. GILA WOODPECKER, *C. uropygialis;* Lower Colorado River of the West. CALIFORNIA WOODPECKER, *Melanerpes formicivorus;* California and Northern Mexico. LEWIS'S WOODPECKER, *M. torquatus;* Western America. To these may be added the *Melanerpes thyroideus* figured by Cassin, found in California and Mexico; and the *Dryotomus imperialis* of Gould, a splendid species, more than two feet long, and the largest of known woodpeckers, also figured by Cassin; found in the forests which skirt the mountains of Oregon, California, and Mexico.



THE WRY-NECK.

THE YUNCINÆ OR WRY-NECKS.

This group includes only a few species: the WRY-NECK or CUCKOO'S MATE, *Yunx torquilla*—*Torcol* of the French—is the most noted; it is a beautiful bird, though its colors are different shades of brown and gray; its name is derived from its habit of twisting its neck about in various directions, which has also given it the title of *Snake-Bird*. It is six inches long, and feeds largely on ants, which it catches upon its glutinous and extensile tongue; it also eats elder-berries. It makes its nest in a hollow of a tree, and lays about eight eggs. It inhabits Europe, Asia, and Africa; it is easily tamed, and becomes a pleasing pet in confinement.

THE PICULETS OR PICUMNINÆ.

These are small birds, closely resembling the woodpeckers, nidifying in holes in trees, which they excavate, and laying only two eggs: found in South America, India, and Asiatic islands.

The *Capitoninæ* or *Barbets* are placed in this connection by some naturalists, but we have united them with the *Bucconinæ*.

THE PSITTACIDÆ OR PARROTS.

The general form of these birds may be stated as short, strong, and compact, but as deficient in elegance, especially in the short and even-tailed species, in which the great bulk of the head and bill seems disproportioned to the rest of the body. In the *Parrakeets* this disproportion is in a great degree counteracted by the elongation of the tail, and many of them exhibit an elegance and gracefulness of carriage surpassed by few other birds. The formation of the feet, which are *zygodactyle*, or with the toes placed two forward and two backward, and in all but a few aberrant species, expressly formed for firm prehension and climbing, evidently points to woods and forests as

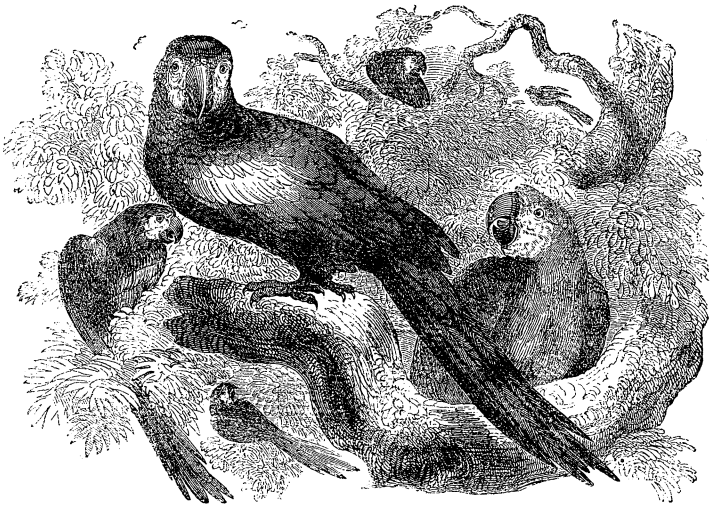
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PARROTS AND COCKATOOS.

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MACAWS.

the natural habitat of the race. It is accordingly in those regions where the trees are clothed with perpetual verdure, and where a never-failing succession of fruits and seeds can be procured, that the Parrots are found in the greatest number and profusion. Thus, the recesses of the interminable forests of South America are enlivened by the presence of the superb *Macaws*, and the nearly allied species of the genus *Psittacara;* those of India and its islands by the elegantly shaped members of the genus *Palæornis*, and the scarlet-clothed *Lories;* while those of Australia resound with the harsh voice of the *Cockatoos*, and the shriller screams of the insectivorous *Trichoglossi*, and broad-tailed *Parrakeets*, or *Platyceri*. In these, their natural situations, their movements are marked by an ease and gracefulness we can never see exhibited in a state of confinement. They are represented as climbing about the branches in every direction, and as suspending themselves from them in every possible attitude; in all their movements they are greatly assisted by their hooked and powerful bill, which is used, like the foot, as an organ of prehension and support.

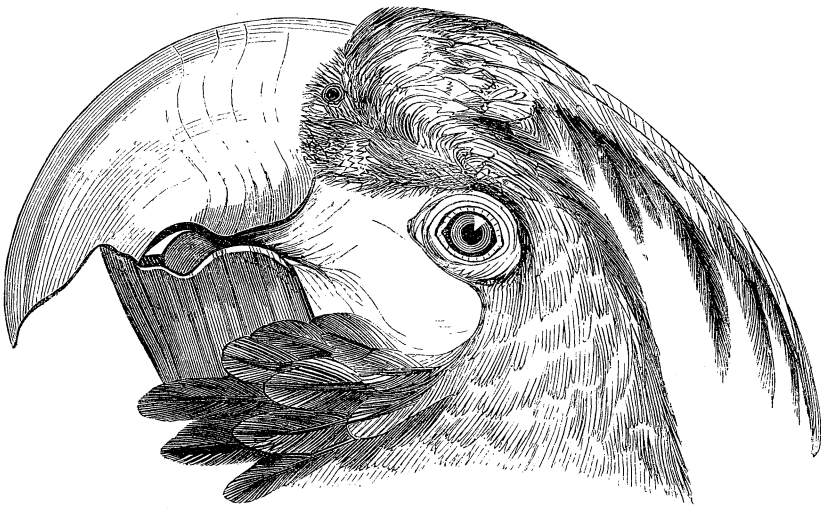
The pointed and ample wing, which prevails among the Parrots, indicates a corresponding power of flight; and, accordingly, we learn from those who have enjoyed the opportunity of seeing and studying them in their native wilds, that it is rapid, elegant, and vigorous, capable of being long sustained, and that many of the species are in the habit of describing circles and other aerial evolutions, previous to their alighting upon the trees which contain their food. Thus Audubon, in his account of the Carolina Parrot, says: "Their flight is rapid, straight, and continued through the forests, or over fields and rivers, and is accompanied by inclinations of the body, which enable the observer to see alternately their upper and under parts. They deviate from a direct course only when impediments occur, such as trunks of trees or houses, in which case they glance aside in a very graceful manner, as much as may be necessary. A general cry is kept up by the party, and it is seldom that one of these birds is on the wing for ever so short a space without uttering its cry. On reaching a spot which affords a supply of food, instead of alighting at once, as many birds do, the Parrakeets take a good survey of the neighborhood, passing over it in circles of great extent, first above the trees, and then gradually lowering, until they almost touch the ground, when, suddenly reascending, they all settle in the tree that bears the fruit of which they are in quest, or on one close to the field in which they expect to regale themselves."

Many of the species are gregarious, and except during the breeding season, are always seen in large and numerous bodies; others, as the Black Cockatoo, are met with in pairs or families. The places selected for hatching their eggs and rearing their young are the hollows of decayed trees; they make little or no nest, but deposit their eggs, which, according to the species, vary

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from two to five or six in number, upon the bare rotten wood. In these hollows, it is said, they also frequently roost during the night, and such, we learn, is the practice of the Carolina parrot just mentioned, for the same author observes: "Their roosting place is in hollow trees, and the holes excavated by the larger species of Woodpeckers, as far as these can be filled by them. At dusk, a flock of Parrakeets may be seen alighting against the trunk of a sycamore or any other tree where a considerable excavation exists within it. Immediately below the entrance, the birds all cling to the bark, and crawl into the hole to pass the night. When such a hole does not prove sufficient to hold the whole flock, those around the entrance hook themselves on by the tip of the upper mandible, and thus remain for the night. I have," adds the narrator, "frequently seen them in such positions by means of a glass, and am satisfied that the bill is the only support in such cases."

The natural notes of this tribe of birds consist entirely of hoarse or shrill and piercing screams, with little or no modulation, and frequently reiterated during flight, as well as when otherwise engaged in feeding, bathing, or preserving their plumage. The power of imitating the human voice, and learning to articulate a variety of words and sentences, is not possessed by all the species, but is principally, though not wholly, confined to the even-tailed Parrots, in which the tongue is large, broad, and fleshy at the tip. In disposition, with the exception of one or two forms, they are quiet and docile, and easily reconciled to confinement, even when taken at an adult age. Their flesh is said to be tender and well flavored, particularly that of the younger birds, and is frequently used as food by the inhabitants in the countries which they inhabit.



HEAD OF MACAW.

The general characters of the family are: bill convex, large, deflected, thick, and strong; the upper mandible, overhanging the under, hooked at the tip, and furnished with a small cere at the base; the under mandible thick, ascending, and forming, when closed, an angle with the upper; tongue thick, fleshy, and soft; nostrils round, placed in the cere at the base of the bill; feet scansorial, the external toes longer than the inner. The upper mandible is movable, and in order to work their powerful bills, the muscles connected with them are more numerous than in any other birds. They are monogomous, live on fruits of various kinds, use their bills in climbing, and their feet like hands in grasping. Some of the species live to the age of more than a hundred years. In regard to their internal structure, we may observe, that the intestinal canal is of great length, and destitute of cœca. The loquacity of Parrots, and their extraordinary powers of imitation and mimicry, together with the splendor of their plumage, have rendered them at all times favorite domestic birds, and numerous anecdotes are related in proof of their sagacity and vocal ability.

These birds are divided by many naturalists into numerous genera, but we shall follow Bechstein, and include them in one, that of PSITTACUS. We shall present them, however in five divisions—the *Macrocercinæ* or MACAWS, found in South America: the *Psittacinæ* or PARROTS—properly so called—the short and even-tailed species, found distributed throughout all divisions of the globe within the tropics, and including the *Psittacara* of South America: the

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Lorianæ or LORIES, found in Africa and Asia, and including some of the most intelligent of the family: the *Plyctolophinæ* or COCKATOOS, natives of Asia, the Asiatic Islands, and Australia: and the *Parrakeets*, all small birds, some long-tailed and some short-tailed, and natives of various countries.

THE MACROCERCINÆ OR MACAWS.



RED AND BLUE MACAW.

The RED AND BLUE MACAW, *Psittacus macao—Ara rouge* of the French—is one of the largest of the Parrot tribe, being two feet and eight inches long; the head, neck, breast, belly, shanks, upper part of the back, and superior wing-coverts, a beautiful scarlet; the lower part of the back and rump light blue; other parts variegated with blue, yellow, green, and light brown. It is a native of Brazil and Guiana, and is generally to be met with in pairs in swampy forests. Its beautiful plumage is its chief recommendation for the house, but it may be taught to utter a few words, to know its name, and to come at its master's call. It is, however, awkward in its movements, and vicious in some of its habits.

The BLUE and YELLOW MACAW, *P. Ararauna—Ara bleu* of Buffon—is the same length as the preceding, and is richly colored with green, blue, and yellow; found in Brazil, Guiana, and some of the West Indies. Its qualifications as a cage-bird are similar to the preceding.

The GREAT GREEN MACAW, *P. militaris* of Linnæus, is two feet four inches long; general color grass-green; the rump blue; very docile and talkative, obedient, faithful, and good-tempered; a scarce species, found in South America.

THE PSITTACINÆ OR TRUE PARROTS.

The BLUE-HEADED PARROT, *P. cyanocephalus*, eleven inches long; finely colored with blue, yellow, green, and violet; found in the East Indies; is very beautiful, but cannot be taught to speak.

The AMBOINA PARROT, *P. Amboinensis*—called by the French *L'Aurore*—is sixteen inches long; the head, nape of the neck, and all the lower parts of the body vermilion; upper part of the body fine green; a native of Amboina; it is wild, shy, whistles shrilly, but does not learn to talk.

The PURPLE PARROT, *P. Pennanti, Platycercus Pennanti* of Gray—called *Palm-Bird* by dealers—size of a sparrow-hawk; prevailing color red, though the ground color is black; tail dark blue; scarce; very beautiful, but timid, and difficult to teach; native of Australia.

The WHISKERED PARROT, *P. bimaculatus*, fourteen inches long; ground color grass green; beneath dark rose; docile, talkative, and affectionate; native of Australia.

The COMMON GRAY PARROT or ASH-COLORED PARROT, *P. erythacus*, nine inches long; prevailing color ash-gray; tail scarlet, and short; found in Guinea and vicinity. It is one of the most common and docile species; it easily learns to speak and whistle, is fond of imitating the voices of children, and prefers to be taught by them. It has a great turn for imitation; one of

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this species was taught to speak by a sailor, in the course of a voyage from Guinea, and acquired so exactly his harsh voice and cough as to be frequently mistaken for him. It was afterward instructed by a young man, and although it then heard no voice but that of its teacher, the former lessons were never forgotten; and it often amused the bystanders by suddenly passing from a soft and agreeable voice to its old hoarse sea-tone. This bird has not only the power of mimicking the human voice, but by its attention and manifest effort, shows also a desire of imitation. It continually repeats the syllables which it has heard, and, in order not to be misled in memory, endeavors to cry down all sounds which may disturb it. Its lessons make so deep an impression that it often dreams aloud. When young, its memory is so good as to retain whole verses and sentences. Rhodiginus mentions a Gray Parrot which could repeat the Apostles' Creed without a slip, and was on that account bought by a cardinal for one hundred crowns.

The Common Amazon Parrot, *P. æstivus*, size of a pigeon; colors various, yellow and blue generally prevailing, with green, red, violet, blue, and black; sociable and faithful, but learns to speak with difficulty; native of Mexico and south to Brazil.

The Yellow-headed Amazon Parrot, *P. ochrocephalus*, fourteen inches long; prevailing color yellowish-green, with red, green, and black; very beautiful, but unable to talk, and only utters a harsh scream; native of South America.

The Blue-faced Parrot, *P. autumnalis*, size of the preceding; colors green and red; learns but little, and continually cries *girr, girr;* native of Guiana.

The Blue-necked Parrot, *P. mestruus*, size of the ash-gray parrot; head, neck, and part of the breast indigo-blue; back, belly, wings, and thighs green; the feathers on the belly tipped with blue; beautiful, tame, and gentle, but does not speak; native of Guiana.

The White-fronted Parrot, *P. leucocephalus*, size of a house-pigeon; prevailing color green, with scarlet, red, brown, and blue; tame and talkative, and a great imitator of the voices of dogs, cats, and sheep.

The Pavouan Parrot, *P. Guianensis—Psittacara* or *Conurus Guianensis*, and an example of what are called the *Parrakeet Macaws* of South America—is twelve inches long; colors green and yellow; learns to speak more easily and perfectly than any other of the long-tailed parrots. Levaillant saw one that would lie on his back, fold his feet in the attitude of prayer, and repeat the whole of the Lord's Prayer in Dutch.

The Gray-breasted Parrot, *P. murinus* or *Conurus murinus*, is of a silver-gray color; eleven and a half inches long; is a quiet and gentle species, and learns a few words; found in South America.

The Illinois Parrot, *P. pertinax* or *Conurus pertinax*, one of the most common species in the hands of the bird-sellers; nine and a half inches long; prevailing color green; yellowish-gray on the lower part of the body; forehead, cheeks, and throat orange; belly spotted with orange; native of Brazil and Guiana, where it is seen in flocks of five hundred, one always appointed as a sentinel while they are feeding. It is a beautiful bird, and is very affectionate, but its cry is harsh, and its talking capacity very limited.

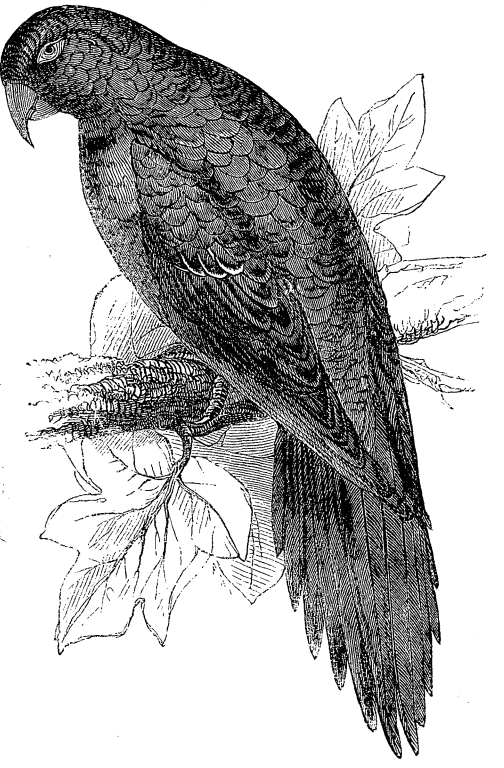
The Yellow Parrot, *P. solstitialis* or *Conurus solstitialis*, same size as the preceding; prevailing color orange, with ash, green, olive, and orange; found in Angola; learns to speak easily and well.

The Carolina Parrot, *P. Carolinensis—Conurus Carolinensis* of De Kay and others—is a native of Guiana, but is found as far north as Virginia, and in the west as far as Illinois. They are exceedingly sociable in their habits, always flying in large flocks, and roosting in companies of thirty or forty together in the inside of a hollow tree. They are greatly attached to each other, nestling close together, and scratching one another's heads in a most affectionate manner. They manifest this attachment in an equally striking manner when any of their companions fall into misfortune. In illustration of this we may quote the following passage from Wilson's American Ornithology. "At Big Bone Lick, thirty miles above the mouth of Kentucky River, I saw them in great numbers. They came screaming through the woods in the morning, about an hour after sunrise, to drink the salt water, of which they, as well as the pigeons, are remarkably fond. When they alighted on the ground, it appeared at a distance as if covered with a carpet of the richest green, orange, and yellow; they afterward settled in one body on a neighboring tree, which stood detached from any other, covering almost every twig of it, and the sun,

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THE CAROLINA PARROT.



PARRAKEET MACAW.

shining strongly on their gay and glossy plumage, produced a very beautiful and splendid appearance. Here I had an opportunity of observing some very particular traits of their character; having shot down a number, some of which were only wounded, the whole flock swept repeatedly around their prostrate companions, and again settled on a low tree, within twenty yards of the spot where I stood. At each successive discharge, though showers of them fell, yet the affection of the survivors seemed rather to increase; for after a few circuits around the place, they again alighted near me, looking down on their slaughtered companions with such manifest symptoms of sympathy and concern as entirely disarmed me." This is the only species of parrot native of the United States; in captivity it is docile and sociable, and soon becomes very familiar. Like the other members of the group, it deposits its eggs in hollow trees, but is said to carry its sociable habits even into the business of incubation, several couples usually breeding in the same cavity.



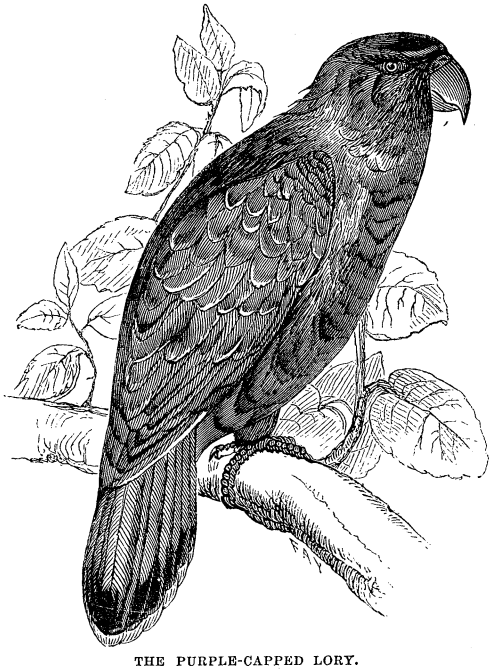
THE LONG-BILLED PARROT.

The Long-billed Parrot, *Nestor productus* of Gould, the genus forming a connecting link between the parrots and cockatoos, is fifteen inches long; general color deep red, with yellow, olive, and brown; its voice harsh, like the barking of a dog; feeds on fruits and leaves; native of Australia and Norfolk Island.

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THE LORIANÆ OR LORIES.

The CERAM LORY, *P. garrulus*, is ten or eleven inches long; variable in color, though generally scarlet, with patches of green and yellow, is most common; a native of the Moluccas; very docile and teachable.



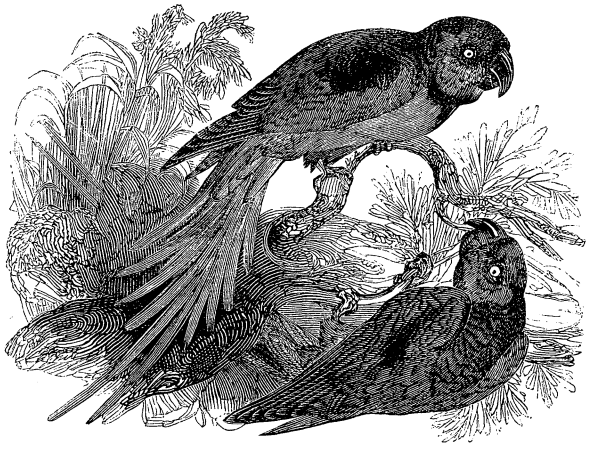
THE PURPLE-CAPPED LORY.

The PURPLE-CAPPED LORY, *P. domicella*, ten and a half inches long; prevailing color red; a very docile, affectionate, and loquacious species; it talks in a hollow, ventriloquial tone, whistles tunes it has heard, and delights in being caressed; a rare and costly species; native of the Moluccas and New Guinea.

The BLACK-CAPPED LORY, *P. Lory*, ten and three-quarter inches long; prevailing color scarlet, with black, blue, and yellow; is docile and affectionate, like the preceding; a native of the Philippines.

THE PARRAKEETS.

The ALEXANDRINE PARRAKEET, *Palæornis Alexandri* of Vigors, may be taken as an example of the long-tailed parrakeets; its length is eighteen to twenty inches; general color emerald-green; tail long and graduated, the two middle feathers greatly exceeding the others in length; the form, attitudes, and movements elegant; it is a native of India and Ceylon; is very noisy, and may be taught to speak with tolerable distinctness. This species was brought from the East by Alexander, in his famous expedition.



THE ALEXANDRINE PARRAKEET.

The ROSE-RINGED PARRAKEET, *P. Manillensis*—*Palæornis torquatus* of some authors—is fifteen inches long; plumage green, verging on yellow below; the feathers remarkable for the softness of their colors and silkiness of their texture; very beautiful, but rarely learns to speak; found in the Philippine Islands.

The RED-CRESCENTED PARRAKEET, *Paleornis lunatus*, eleven and a half inches long; upper part green, each feather having a black shaft; lower parts green; breast tinged with red. It is a lively species, and learns to speak very distinctly.

The LONG-TAILED GREEN PARRAKEET, *P. rufirostris*, twelve inches long; prevailing color yel-

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owish-green; easily taught to speak, whistle, and imitate the cries of birds and animals; it is, however, excessively noisy, and sometimes becomes very wearisome on this account.



NYMPHILUS NOVÆ HOLLANDIÆ.

The Red and Blue-headed Parrakeet, *P. cunicularis*, is ten inches long; prevailing color grass-green; native of South America; a handsome species, but never learns to speak well.

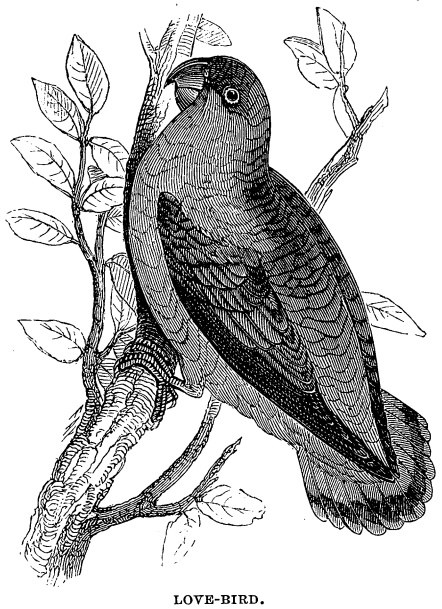
The Cardinal Parrot, *P. cardinalis*, twelve inches long; head violet, tinged with blue and red; a black band around the neck; upper part of the body dark green; lower part light green. There are several varieties, as the *Blossom-headed Parrakeet*, *Rose-headed Ring Parrakeet*, and *Bornean Parrakeet*. They are noisy birds, but cannot be taught to speak, and are only valued for their beauty; found in India.

The Little Rose-ringed Parrakeet, *P. pullarius*—called *Guinea-Sparrow* by the bird-sellers—is but six inches long, the size of a cedar-bird; general color green; their cry is unpleasant, and they cannot be taught to speak; but they are affectionate to each other and are beautiful and pleasing; natives of Guinea, India, and Java.

The Little Blue and Green Parrakeet, *P. passerinus*, four inches long, size of a sparrow; general color green; rump blue; cannot speak; native of Brazil and Guiana. The two preceding belong to the genus *Psittacula* or *Love-Birds*, having short, square tails.

The Warbling Grass Parrakeet, *Melopsittacus undulatus*, is found in large flocks in Australia, where they feed on the seeds of grasses; they are minute, elegant creatures, with long tails, and instead of a screech, have a soft, warbling note.

The Ground Parrakeet, *Pezoporus formosus*, of the same regions, is a foot long; beautifully colored with green, black, and brown; lives entirely on the ground. The *Nymphilus Novæ Hollandiæ* is also one of the ground parrakeets, of the same size as the preceding; general color yellow; so abundant in Australia that, as Mr. Gould tells us, a gentleman shot two hundred in a single excursion.



LOVE-BIRD.

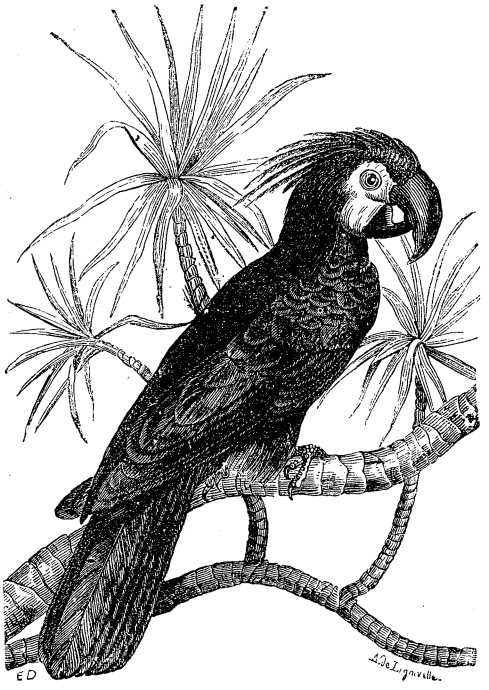
The Pigmy Microspitta, *Microspitta pygmæa*, is four inches long; green above and yellow below; the tail brown. It is said to be the smallest of parrots; found in the Polynesian islands.

THE COCKATOOS.

The Great White Crested Cockatoo, *Plyctolophus cristatus*, is seventeen inches long; the whole plumage white, except some slight patches of sulphur-color; the crest on the head five inches long, and is elevated or depressed at will. It is generally kept in a large, ball-shaped wire cage, provided with two perches and a large metal ring, in which it likes to swing. It is very tame and gentle, but is taught to speak with difficulty; a native of the Moluccas.

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The Sulphur-crested Cockatoo, *P. sulphureus*, *Cacatua sulphurea* of some authors, is eleven and a half inches long; general color white, with a tinge of sulphur-yellow; easily tamed, affectionate, and fond of being caressed. There are two varieties, differing only in size; the larger is a native of Australia, the smaller of the Moluccas.



THE BLACK COCKATOO.



THE WHITE-CRESTED COCKATOO.

The Great Red-crested Cockatoo, *P. Moluccensis*, is larger than the great white cockatoo; general color white, tinged with pale rose; the crest very large; a beautiful and majestic bird, very gentle, imitating the cries of hens, crowing of cocks, &c., at the same time flapping its wings. Its native cry is *cockatoo* and *derdong;* a native of the Moluccas.

The Red-vented Cockatoo, *P. Philippinarum*, thirteen inches long; general color white; feathers of the belly and tail-coverts red, tipped with white; tuft only visible when erected; tame and beautiful, but has a harsh cry, and is unable to speak; native of the Philippine Isles.

Banks's Cockatoo, *P. Banksii*, is the most rare, costly, and beautiful of the cockatoos; twenty-two to thirty inches long; general color black; feathers on the breast edged with yellow; yellow stripes upon the breast and belly; the crest spotted with yellow; tail feathers marked with crimson and orange; native of Australia.

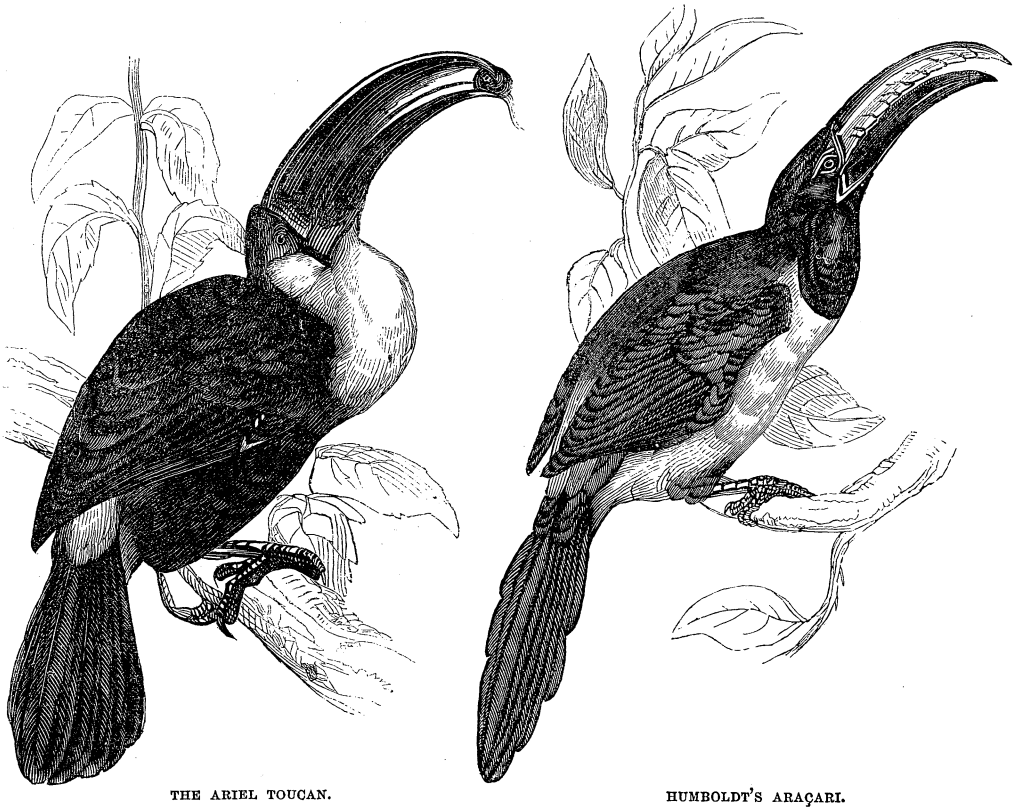
The Black Cockatoo, *Microglossum aterrimum* of Lesson, noted for its enormous bill, is blue-black, and a native of New Guinea.

There are other species of cockatoo, especially in the Australian islands, which seem to abound with parrot-like birds, some of which are of very eccentric characteristics. Among them is the *Strigops habroptilus*, in New Zealand, called *Kakapo* by the natives. This seems to be half owl and half cockatoo; it is strictly nocturnal, remaining in holes by day, and going forth only at night. Its food consists partly of roots, and it is constantly grubbing in the earth; so that its beak is like a pig's snout, always covered with mud and dirt. It has a habit of making paths a foot wide, which appear as if made by human art.

The natives of those parts of Australia which abound in cockatoos take a singular method of killing these birds. Captain Grey, in his "Travels in Australia," says: "Perhaps as fine a sight as can be seen in the whole circle of native sports is the killing cockatoos with the *kiley* or *boome-*

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rang. A native perceives a large flight of cockatoos in a forest which encircles a lagoon; the expanse of water affords an open clear space above it, unencumbered with trees, but which raise their gigantic forms all around, more vigorous in their growth from the damp soil in which they flourish. In their leafy summits sit a countless number of cockatoos, screaming and flying from tree to tree, as they make their arrangements for a night's sound sleep. The native throws aside his cloak, so that he may not have even this slight covering to impede his motions, draws his kiley from his belt, and, with a noiseless, elastic step, approaches the lagoon, creeping from tree to tree, and from bush to bush, and disturbing the birds as little as possible. Their sentinels, however, take the alarm, the cockatoos farthest from the water fly to the trees near its edge, and thus they keep concentrating their force as the native advances; they are aware that danger is at hand, but are ignorant of its nature. At length the pursuer almost reaches the edge of the water, and the scared cockatoos, with wild cries, spring into the air; at the same instant the native raises his right hand high over his shoulder, and, bounding forward with his utmost speed, to give impetus to his blow, the kiley quits his hand as if it would strike the water; but when it has almost touched the unruffled surface of the lake, it spins upward with inconceivable velocity, and with the strangest contortions. In vain the terrified cockatoos strive to avoid it; it sweeps wildly and uncertainly through the air—and so eccentric are its motions, that it requires but a slight stretch of the imagination to fancy it endowed with life—and with fell swoops in rapid pursuit of the devoted birds, some of whom are almost certain to be brought screaming to the earth. But the wily savage has not yet done with them. He avails himself of the extraordinary attachment which these birds have for one another, and fastening a wounded one to a tree, so that its cries may induce its companions to return, he watches his opportunity, by throwing his kiley or spear, to add another bird or two to the booty he has already obtained."



THE ARIEL TOUCAN. HUMBOLDT'S ARAÇARI.

THE RHAMPHASTIDÆ OR TOUCANS.

These birds are distinguished by their enormous bills, sometimes as large as the body; hence the French name of *Tout-bec* or *All-bill.* This feature, however, is very light, its substance being

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filled with air-cells. They are confined to the hot regions of South America, where they are abundant. They live in considerable flocks in the forests, and sit in company on the trees, making an abominably harsh noise. They are omnivorous, feeding not only upon sweet pulpy fruits, which have generally been considered to constitute their whole nourishment, but also upon animal matters of various kinds, such as fish, eggs, small birds, and reptiles, and the larvæ of insects. They are said usually to take their food up in the bill, and throwing it into the air, catch it again with open mouth and swallow it directly. They make their nests in the hollows of trees, and lay two eggs. When sleeping, they take good care of their bills and tails, burying the former in their plumage, and laying the latter flat over their backs, so that they appear like balls of feathers. They have a very odd way of sitting upon the trees and moving their bills, at the same time uttering an unceasing cry, whence they are called *Preachers*. Mr. Gould records no less than twenty-two species; the following will give a general idea of the whole.

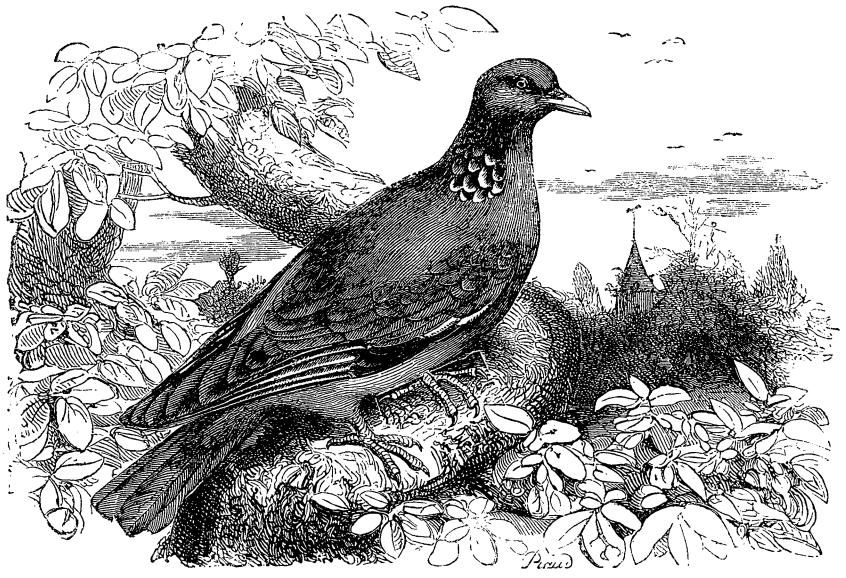
Genus RHAMPHASTOS: *Rhamphastos*.—To this belongs the Brazil Toucan, *R. tucanus*, twenty inches long, the bill six inches; the upper parts are black, with bronze reflections, and various markings of red, crimson, orange, and green. The brilliant feathers were formerly used as decorations by the ladies of Peru and Brazil.

The Ariel Toucan, *R. ariel*—*R. maximus* of Cuvier—is black, with brown reflections, having various splendid markings of orange, citron-green, and lively red; it is twenty-one inches long; found in Brazil.

Genus ARAÇARI: *Pteroglossus*, includes the long-tailed species, in distinction from the preceding, which have short tails. To this belongs Humboldt's Araçari, *P. Humboldtii*, seventeen inches long; bill four, tail graduated; upper surface olive; head, back of the neck, throat, and chest black; under surface pale straw-yellow. The *P. pluricinctus* is twenty inches long; the bill four and a half. Both of the above are natives of Brazil.



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THE RING-DOVE.

ORDER 4. **COLUMBÆ.**

These resemble the gallinaceous birds, and some authors have included them in the same order; in their structure, however, there are some peculiarities. The œsophagus speedily widens into a large crop, situated on both sides of the alimentary canal, which, during the breeding season, is furnished with numerous glands for the secretion of a milky juice; this, mixing with the food in the crop, softens it so as to render it more fit for the nourishment of the young birds, which are fed for a considerable time with food regurgitated by their parents. The gizzard is very powerful, the intestine long and slender, and the cœca small.

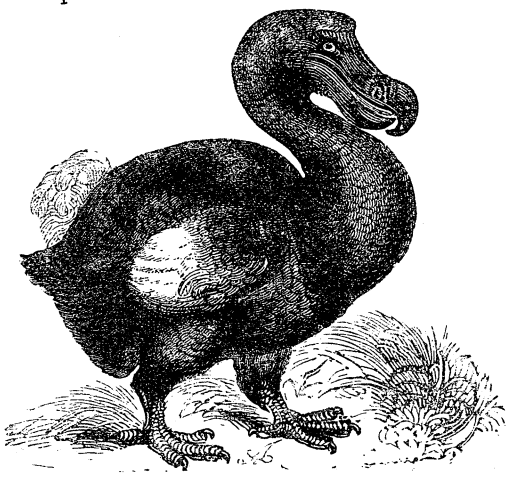
The Columbæ, in general, are arboreal in their habits, but most of them seek their food on the ground, and they all, notwithstanding the shortness of their legs, walk with ease and considerable celerity. Their wings are long and wide, and their flight, as might be expected, is strong and sustained. In their mode of drinking they differ remarkably from all other birds; for, instead of taking up a small quantity of water in the mouth, and then swallowing it by raising the head, they immerse the bill in the water, and drink without stopping until they are satisfied. The pigeons generally nestle in trees or in the holes of rocks; rarely on the ground. The young, when hatched, are quite helpless, and require to be fed carefully by their parents for some time, during which they remain in the nest. The duty of incubation, and the care of the young, is shared by both parents. These birds are found in all the warm and temperate parts of the globe, but it is in the warmer regions that they occur in the greatest abundance. There, also, many of the species attain a splendor of plumage which rivals almost any thing else that we meet with among the feathered inhabitants of the air, and of which our native species, although by no means deficient in beauty, can give us no idea. Everywhere the doves are regarded with more or less favor, doubtless owing in a great measure to their reputation for conjugal fidelity, and the peculiarly melancholy sound of their voice, which is universally a plaintive *cooing*. These characters, coupled with the continual exhibition of all the signs of a most tender affection between the sexes during the breeding season, induced the ancients to consecrate the dove to Venus. In many Christian countries, also, the dove is regarded as sacred, because under its form the Holy Spirit is described as having descended upon our Saviour at his baptism.

THE DIDUNCULIDÆ.

This family includes only a single genus, DIDUNCULUS, and a single species *D. strigirostris*, found in the Navigators' Isles. They are the size of a ruffed grouse; upper surface chestnut-red;

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lower parts black, glossed with green; they fly in pairs or small flocks, feed on fruits and berries, roost on the branches of trees, and build their nests on the rocks. The natives keep them as tame pets.



THE DODO.

THE DIDIDÆ.

Genus DIDUS: *Didus.*—This, the only genus of the group, included the DODO, *D. ineptus*, now extinct. This was larger than a swan, sometimes weighing fifty pounds; the bill was long and strong; the feet short and stout; the wings, furnished only with soft, decomposed plumes, were short, and incapable of enabling the bird to fly; the tail was ornamented with a similar tuft of feathers; the general color a blackish-gray; the plumes of the wings a light ash-color. When the island of Mauritius was discovered in 1598, this bird was quite abundant there, as well as in the neighboring island of Bourbon; but it has been gradually extirpated, and now some paintings, made of it long ago—two heads, a foot, and a few feathers—are the only existing memorials of this remarkable bird.

On the little island of Rodriguez, near the island of Mauritius, some bones have been discovered, which are supposed to have belonged to three allied, but all probably extinct species, one of them the Dodo, another the SOLITAIRE, *Didus solitarius*, twice the size of that bird, and the third *Didus Nazarenus*, smaller than either.

THE GOURIDÆ.

These birds, called *Ground-Pigeons*, of which there are several genera, are found in the warm parts of both hemispheres, and some are of considerable size. The GOURA CROWNED PIGEON, *Goura coronata*, is nearly of the size of a turkey, lives in flocks, feeds on seeds, and rarely perches on trees. It is kept in the poultry-yards of Java, where it is a native, but does not breed in Europe or America. The NICOBAR PIGEON, *Calœnas Nicobarica*, is an exceedingly beautiful species, the tail-feathers resembling those of the domestic cock. Its general color is purplish-black; the feathers of the neck long, pointed, and glossed with blue, red, and gold; the wings are blue, the back golden-green, the tail white. It is found in India. The BRONZE-WINGED GROUND DOVE, *Phaps chalcoptera*, is fifteen inches long, and coos so loud that its note is compared to the bellowing of a cow; found in the Australian islands. The GROUND DOVE of the United States—*Columba passerina* of Audubon; *Chamaepelia passerina* of Swainson—is a beautiful species, six and three-quarter inches long; color, light purplish-red, above; reddish below; found in the South Atlantic and Gulf States.

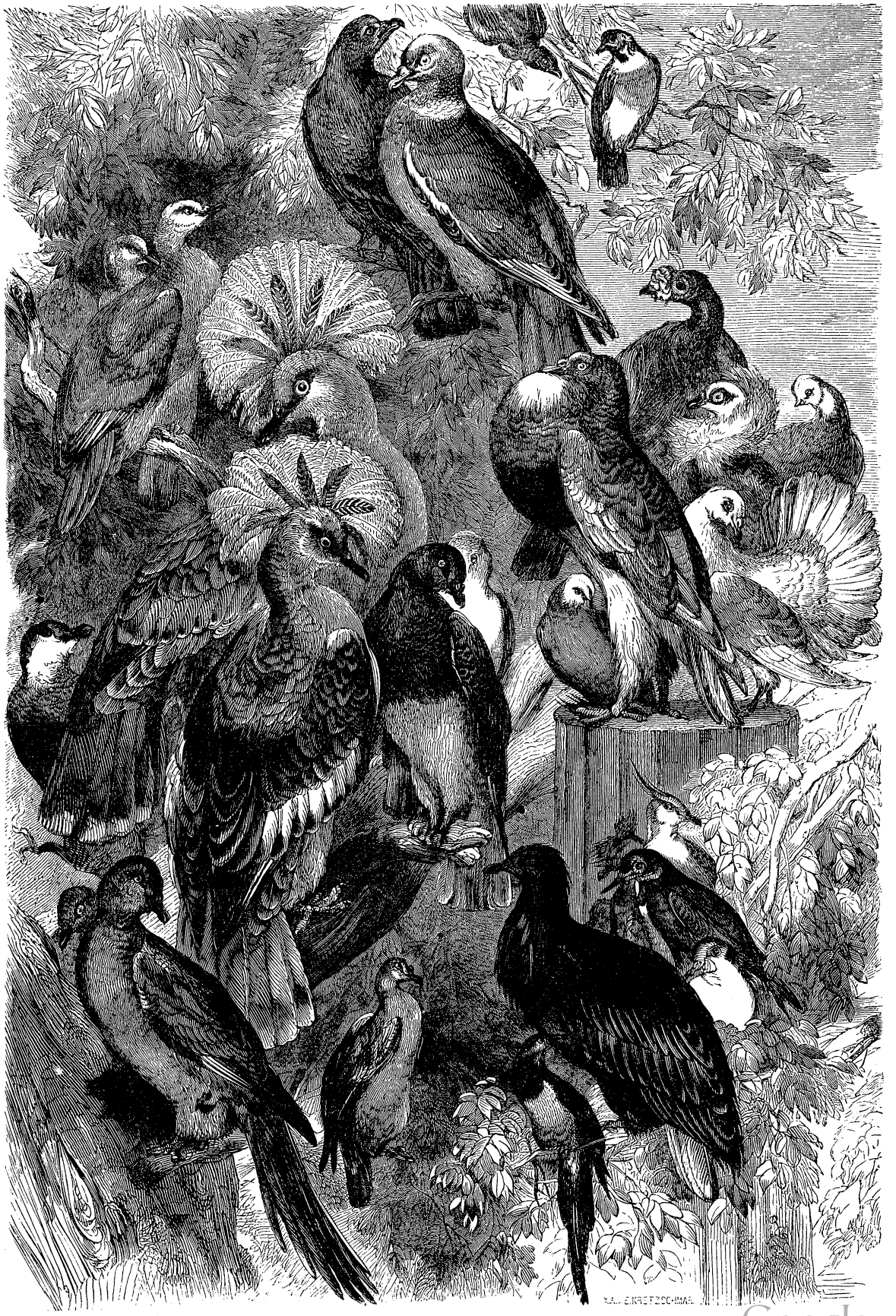
THE COLUMBIDÆ OR TRUE PIGEONS.

Of these birds, called *Pigeons* and *Doves*, there are many species; they live in wooded places, and roost on trees; they feed usually on the ground, picking up seeds of all kinds, young herbage, and roots; in autumn some eat fruits. We can only notice, very briefly, the prominent species. They lay two eggs, and soften the food for the young with a milky substance in their crops.

Genus COLUMBA: *Columba.*—This includes the EUROPEAN STOCK-DOVE—*Pigeon sauvage* of the French—*C. Œnas*, thirteen inches long; general color gray; breast red. It frequents mountainous districts. The RING-DOVE, *C. palumbus*—*Ramier* of the French, *Ringel-Taube* of the Germans—is seventeen and a half inches long, and is one of the largest of the European wild pigeons; general color gray; neck beautifully iridescent. In England it is called *Wood-Pigeon*, *Cushat*, and *Queest.*

The ROCK-DOVE, *C. livia*, is naturally wild, inhabiting high rocks near the sea-coast, in the

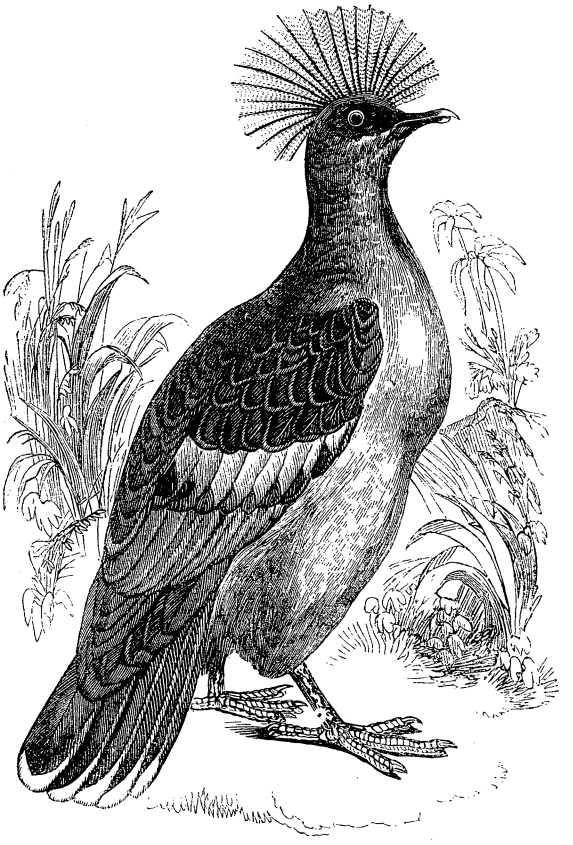
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DOVES AND PIGEONS.

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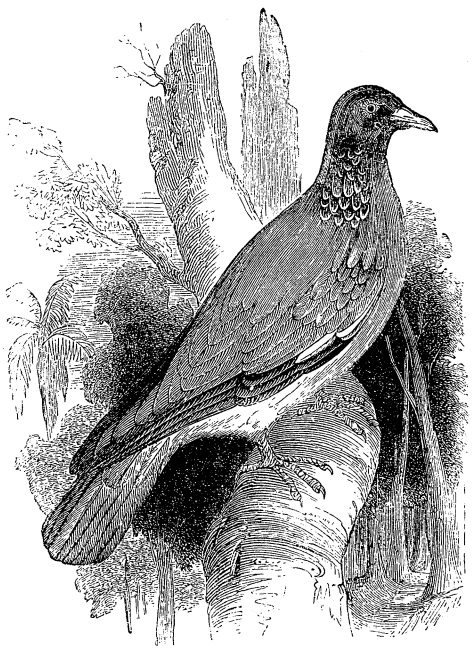
THE GOURA CROWNED PIGEON.

cavities of which it lives a great part of the year. It is widely distributed, and like all the preceding species, is common in Europe and Asia. From this the *Domestic* or *House Pigeon* is derived, this being now cultivated in nearly all parts of the world, and especially in eastern countries—Egypt, Persia, &c. Its prolificness is marvelous; it is said that one pair may produce fourteen thousand seven hundred and sixty young, in four years. The varieties which have been produced from this species are almost endless; we may, however, enumerate the following:

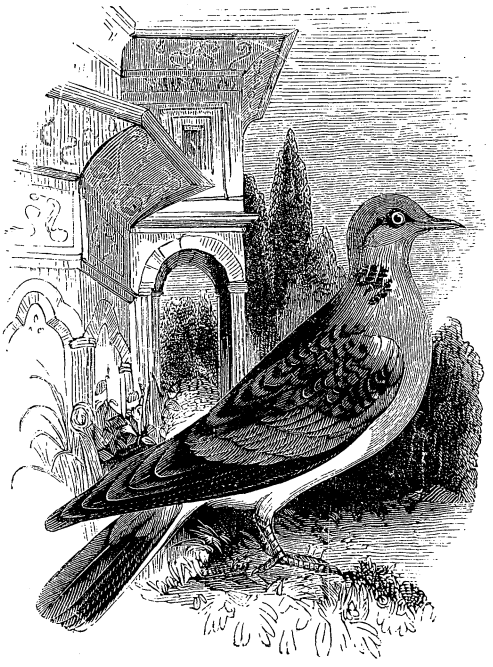
The *Monk* is a crested pigeon. The head and crest are white; the rest of the body yellow, red, blue, or black. The *Shield-Pigeon* is only occasionally crested. The plumage is white, with the exception of the scapulars, wing-coverts, and hinder pen-feathers, which are yellow, red, blue, black, or silvery-gray. The *Swallow-Pigeon* is pure white, except the wings and a round spot on the top of the head, which are yellow, red, blue, black, or silvery-gray. It sometimes has a crest. The *Striped Monk* is black, with a white poll, and white stripes across the wings. The *White-Head* is like the monk in every respect, except in having a white tail. The *Marked Pigeon* is white, with the exception of a small streak on the forehead, and another on the tail, which are dark red, or almost black. The *Starling-necked Pigeon* is blackish-blue, with white stripes across the wings, and a narrow white streak on the breast. The *Veiled Dove* is white, with the exception of the head, neck, and foremost pen-feathers, which are black, red, or yellow. The *Striped Starling-necked White-Head* is the handsomest of all. It is black, with a white poll and tail, and white stripes on the wings and breast.

There are besides these, many other varieties of the domestic pigeon, which, however, are said by some naturalists not to be originally derived from the wild rock-pigeon, but to be themselves indigenous in different parts of the world. Among these are the *Trumpeter-Pigeon*, so called from its peculiar cooing; it is crested, and generally has its feet covered with feathers. It is met with

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THE STOCK-DOVE.



THE ROCK-DOVE.

in all colors, but is often mottled with black and white. It is a good breeder. The *Tumbler*, which derives its name from the fact that it overbalances itself in its flight, is almost as large as the stock-dove. Its beak is short, and the naked circle of the eye is red. The *Jacobine-Pigeon* is a small bird, with a short beak, and having at the top of the neck a collar or stripe of long feathers. In color it resembles the shield-pigeon. The *Peacock* or *Fan-tailed Pigeon* is like the swallow-pigeon in color, but has the power of spreading out its tail like a peacock. The *Perriwigged Pigeon* resembles the veiled pigeon in color, but has a high forehead, a short beak, and a crest, which passes down the sides of the neck and breast like a wig. The *Pouter* is a large pigeon, of various colors. It has a high forehead, a short beak, and possesses the power of inflating the crop to a very large size. The *Turkish Pigeon* is a large bird, of various colors, which has the membrane of the beak, as well as the circle of the eyes, very thick and wrinkled.

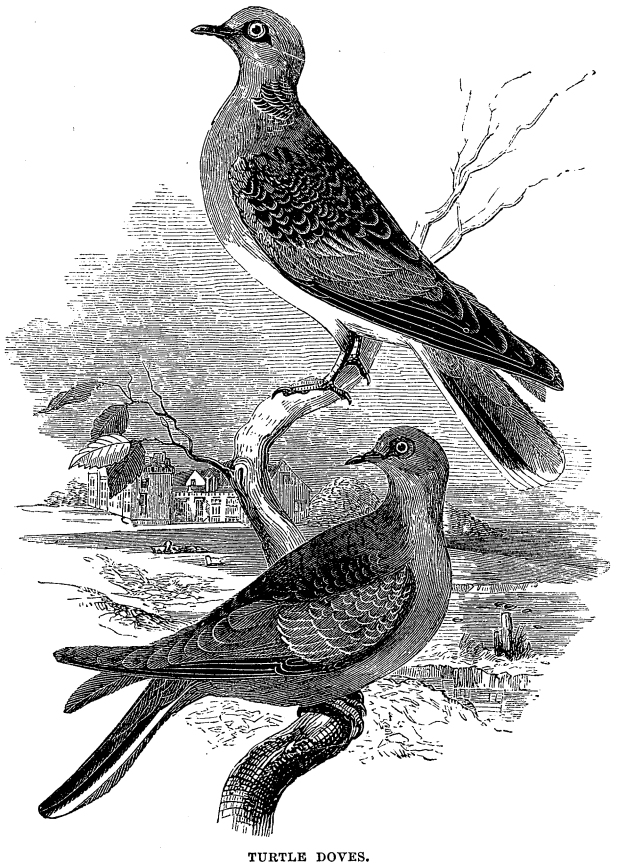
The *Carrier-Pigeon* is supposed by some to be a distinct species, though it is generally regarded as a variety of the house-dove. All the tribes of pigeons are not only swift of flight, but they have an intense love of home, and a remarkable power of discovering their way home from long distances. These capacities are possessed in a high degree by the carrier, and hence it has been celebrated from the remotest antiquity. Anacreon immortalized it as the bearer of epistles. Pliny mentions its use by beleaguered cities. When Modena was invested, he says: "Of what avail were sentinels, circumvallations, or nets obstructing the river, when intelligence could be conveyed by aerial messengers?" In the time of the Crusades these birds were extensively employed by the people of the invested cities; and there are instances mentioned in which the pigeon was captured by the besiegers, and made the bearer of a very different message from that with which it was originally charged. In some cases hawks were kept by the besieging parties for the express purpose of being flown at and intercepting the carriers. These birds have been also used for the purposes of commerce as well as those of war. When the Turkey Company of England was flourishing, and a number of English merchants were resident at Aleppo, the grand emporium of the trade, carrier-pigeons were employed to bring intelligence from the port to the city. Scanderoon, the port of Aleppo, is distant about eighty miles, as the bird flies. The pigeon could bring intelligence over this distance in about three hours, while it could not come by any other channel in much less than the same number of days. Thus, those merchants who em-

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ployed pigeons could, upon the arrival of ships, obtain information which they had abundant time to turn to advantage. One case is mentioned, upon authority which there is no reason to doubt, where a merchant killed one of these pigeons by accident, and learned from the billet which it bore that there was a great scarcity of galls in England. Taking advantage of this, and buying up nearly the whole quantity in the market, he at once cleared a sum which in those days was considered an ample fortune.

In the East, intelligence was in former times communicated by these pigeons much in the same manner as was done by telegraphs in later periods. Slight towers were built along the line, at thirty or forty miles distant from each other, and pigeons were employed in flying from tower to tower. These wore a very small box of gold, of extreme thinness, suspended from the neck; and, as the pigeon wore this box always, it could carry the message and bring back the intelligence. Sentinels were kept constantly watching on the towers, and, as each flew from its own tower to the next and back again, the information, though not so expeditious, certainly could be rendered much more effective than that which the common telegraph afforded. In modern times these birds have been used in Europe by stock speculators between the principal cities. In the United States they were employed a few years ago to carry European news from Halifax to Boston, on the arrival of the steamers there; they were also used between Sandy Hook and New York to announce the arrival of vessels; but the electric telegraph has destroyed their vocation.

The performances of these birds will, however, always remain an interesting phenomenon. It is true that they were carefully trained by being taken out and let loose, at first half a mile from home, then a mile, then two, four, six, ten, twenty miles, &c. Those used at Aleppo, to which we have alluded, were trained all the way to Scanderoon; that is, the whole extent of their journey. Only those which showed great aptness were deemed fit for use; and of those which were required to achieve a flight of over two hundred and fifty miles, nearly half were lost. If we take into account these facts, and consider the amazing reach of the sight of birds, there is nothing very wonderful in the performances of carrier-pigeons; they are curious and interesting as showing the use man may make of the powers and instincts of birds; but the untaught migrations of young birds from the northern to the southern zone, displays an infinitely higher and more mysterious instinct.



TURTLE DOVES.

The Turtle-Dove, *C. turtur*, probably the Dove of the Scriptures, is one of the most beautiful of the species, and has been celebrated for its graceful form, its gentle manners, and its mournfully plaintive notes. Its length is eleven and a half inches; general color above greenish-brown; chin, neck, and breast pale wood-brown; beneath white.

The *Domestic Dove* or *Pigeon of Europe*, has been transplanted to this country, and is bred

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here in large numbers. Other species of *Columba* known in the United States are as follows: *C. fasciata*, sixteen inches long, purplish-gray, found in the Rocky Mountains; *C. leucocephala*, fourteen and a half inches long, slate-blue, head white, found in the Keys of Florida; *C. zenaida*—*Zenaida amabilis* of Bonaparte—a beautiful and gentle species, twelve and a half inches long, brownish-ash, found in Florida and the West Indies: *C. flavirostris*, found on the lower Rio Grande: *Melopelia leucoptera; Scardafella squamosa: Oreopeleia Martinica* and *Starnœnas cyanocephala*, all found in the Southern Territories of the United States and the West Indies.

Genus ECTOPISTES: *Ectopistes.*—This includes the COMMON WILD PIGEON of the United States—often called the *Passenger Pigeon*—*E. migratoria*, sixteen to eighteen inches long, bluish-gray above, breast reddish-brown: the food consists of beech-nuts, acorns, berries, rice, seeds, &c. It ranges throughout North America from 25° to 62° north. It builds a slight, flat nest of sticks, and lays two eggs. It is migratory, moving to the northwest in vast flocks in April and returning to the South in August and September. The migrations are variable as to time and numbers; latterly they have been less multitudinous than they were fifteen or twenty years ago. Audubon noticed a continuous flight for three days; the whole number of birds, according to this calculation, amounting to one billion one hundred and fourteen millions! As every pigeon consumes half a pint of food daily, the consumption of these each day would be eight millions seven hundred and twelve thousand bushels! Wilson gives the following graphic account: "The roosting-places are always in the woods, and sometimes occupy a large extent of forest. When they have frequented one of those places for some time, the appearance it exhibits is surprising. The ground is covered to the depth of several inches with their dung; all the tender grass and underwood destroyed; the surface strewed with large limbs of trees, broken down by the weight of the birds collecting one above another; and the trees themselves, for thousands of acres, killed as completely as if girdled with an axe. The marks of their desolation remain for many years on the spot; and numerous places could be pointed out where, for several years after, scarcely a single vegetable made its appearance. When these roosts are first discovered, the inhabitants, from considerable distances, visit them in the night with guns, clubs, long poles, pots of sulphur, and various other engines of destruction. In a few hours they fill many sacks and load horses with them. By the Indians a pigeon-roost or breeding-place is considered an important source of national profit and dependence for that season, and all their active ingenuity is exercised on the occasion." "This breeding-place differs from the former in its greater extent. In the western countries, namely, the States of Ohio, Kentucky, and Indiana, these are generally in back woods, and often extend in nearly a straight line across the country for a great way. Not far from Shelbyville, in the State of Kentucky, about five years ago, there was one of these breeding-places, which stretched through the woods in nearly a north and south direction, was several miles in breadth, and was said to be upward of forty miles in extent. In this tract almost every tree was furnished with nests wherever the branches could accommodate them. The pigeons made their first appearance there about the 10th of April, and left it altogether with their young before the 25th of May. As soon as the young were fully grown, and before they left the nests, numerous parties of the inhabitants from all parts of the adjacent country came with wagons, axes, beds, cooking utensils, many of them accompanied by the greater part of their families, and encamped for several days at this immense nursery. Several of them informed me that the noise was so great as to terrify their horses, and that it was difficult for one person to hear another speak without bawling in his ear. The ground was strewed with broken limbs of trees, eggs, and young squab pigeons, which had been precipitated from above, and on which herds of hogs were fattening. Hawks, buzzards, and eagles were sailing about in great numbers, and seizing the squabs from the nests at pleasure, while, from twenty feet upward to the tops of the trees, the view through the woods presented a perpetual tumult of crowding and fluttering multitudes of pigeons, their wings roaring like thunder, mingled with the frequent crash of falling timber; for now the axemen were at work, cutting down those trees that seemed to be most crowded with nests, and contrived to fell them in such a manner, that in their descent they might bring down several others; by which means the falling of one large tree sometimes produced two hundred squabs, little inferior in size to the old ones, and almost one heap of fat. On some single trees upward

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of one hundred nests were found. It was dangerous to walk under these flying and fluttering millions, from the frequent fall of large branches, broken down by the weight of the multitudes above, and which in their descent often destroyed numbers of the birds themselves; while the clothes of those engaged in traversing the woods were completely covered with the excrements of the pigeons."

On another occasion* the writer of these pages has treated of this subject as follows: "The story told by Wilson and Audubon as to the amazing quantity of pigeons in the West, was realized by us in Connecticut half a century ago. I have seen a stream of these noble birds, pouring at brief intervals through the skies, from the rising to the setting sun, and this in the county of Fairfield. I may here add, that of all the pigeon tribe —this of our country—the passenger pigeon is the swiftest and most beautiful of a swift and beautiful generation. At the same time, it is unquestionably superior to any other for the table. All the other species of the eastern, as well as the western continent, which I have tasted are soft and flavorless in comparison.



WILD PIGEONS.

"I can recollect no sports of my youth which equaled in excitement our pigeon hunts, generally taking place in September and October. We usually started on horseback before daylight, and made a rapid progress to some stubble-field on West Mountain. The ride in the keen, fresh air, especially as the dawn began to break, was delightful. The gradual encroachment of day upon the sight filled my mind with sublime images: the waking up of a world from sleep, the joyousness of birds and beasts in the return of morning, and my own sympathy in this cheerful and grateful homage of the heart to God, the giver of good—all contributed to render these adventures most impressive upon my young heart. My memory is still full of the sights and sounds of those glorious mornings; the silvery whistle of the wings of migrating flocks of plover—invisible in the gray mists of dawn; the faint murmur of the distant mountain torrents; the sonorous gong of the long-trailing flocks of wild geese, seeming to come from the unseen depths of

* See "Recollections of a Lifetime," 1856. Vol. I., p. 99.

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the skies—these were among the suggestive sounds that stole through the dim twilight. As morning advanced, the scene was inconceivably beautiful—the mountain sides, clothed in autumnal green and purple and gold, rendered more glowing by the sunrise, with the valleys covered with mists, and spreading out like waves of silver; while on every side, the ear was saluted by the mocking screams of the red-headed woodpecker, the cawing of congresses of crows, clamorous as if talking to Buncombe: and finally, the rushing sound of the pigeons, pouring like a tide over the tops of the trees.

"By this time, of course, our nets were ready, and our flyers and stool-birds on the alert. What moments of ecstasy were these, and, especially, when the head of the flock—some red-breasted old father or grandfather—caught the sight of our pigeons, and turning at the call, drew the whole train down into our net-bird! I have often seen a hundred or two hundred of these splendid birds come upon us with a noise absolutely deafening, and sweeping the air with a sudden gust like the breath of a thunder cloud. Sometimes our bush-hut, where we lay concealed, was covered all over with pigeons, and we dared not move a finger as their red, piercing eyes were upon us. When, at last, with a sudden pull of the rope, the net was sprung, and we went out to secure our booty—often fifty, and sometimes even a hundred birds—I felt a fullness of triumph which words are wholly inadequate to express."

It is a curious fact that several specimens of the passenger pigeon have been met with in England; from the extraordinary powers of flight this bird is known to possess, we may conclude that these migrated thither across the Atlantic.

The American Turtle-Dove, *E. Carolinensis*, is eleven and a half inches long; above brownish-drab, breast pale veinous-olive; its flight is quick, vigorous, and accompanied by a peculiar whistling of the wings; it feeds on buckwheat, hemp-seed, Indian corn, and various kinds of berries; it devours large quantities of gravel; to obtain this it is often seen in the highways. It visits the North in spring, lays two white eggs in a rude nest of sticks, and spends the winter at the South, where it associates in considerable flocks; in New England it is generally seen in pairs. In form it greatly resembles the passenger-pigeon; its flesh is much esteemed. Wilson says: "This is a favorite bird with all those who love to wander among our woods in spring, and listen to their varied harmony. They will there hear many a singular and sprightly performer, but none so mournful as this. The hopeless woe of settled sorrow, swelling the heart of female innocence itself, could not assume tones more sad, more tender and affecting. Its notes are four; the first is somewhat the highest, and preparatory, seeming to be uttered with an inspiration of the breath, as if the afflicted creature were just recovering its voice from the last convulsive sobs of distress; this is followed by three long, deep, and mournful moanings, that no person of sensibility can listen to without sympathy. A pause of a few minutes ensues, and again the solemn voice of sorrow is renewed as before. This is generally heard in the deepest shaded parts of the woods, frequently about noon and toward the evening. There is, however, nothing of real distress in all this; quite the reverse. The bird who utters it wantons by the side of his beloved partner, or invites her by his call to some favorite retired and shady retreat. It is the voice of love, of faithful connubial affection, for which the whole family of doves are so celebrated; and, among them all, none more deservingly so than the species now before us."

THE TRERONIDÆ OR TREE-PIGEONS.

These birds are confined to the warmer parts of the old continent, their principal locations being in India, the islands of the Eastern Archipelago, and Australia. Their nourishment consists, for the most part, of fruits, and they are especially arboreal in their habits. In the form of the bill, however, they present some resemblance to the extinct dodo. Many of them are most beautifully colored, rivaling in this respect the parrots and pheasants.

THE MENURAS OR LYRE-BIRDS.

These birds belong to Australia, of which two species are now known, the *Menura superba*, described more than fifty years ago by Davis, and a recently discovered species, described by Mr. Gould under the name of *Menura Alberti*. The Common Lyre-Bird, *Menura superba*, has been

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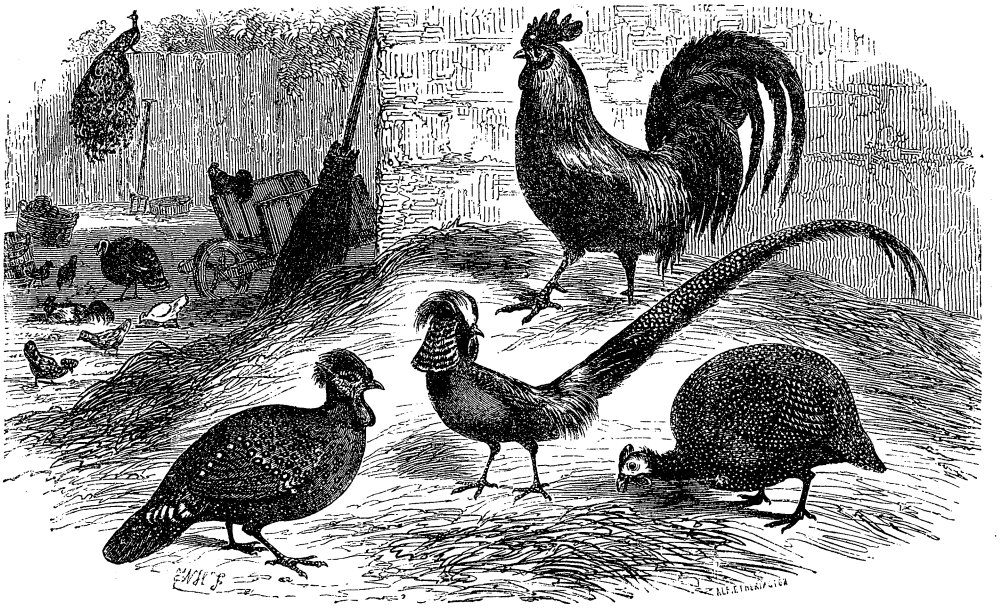
THE SUPERB MENURA.

arranged with very different groups by different authors, some placing it with the gallinaceous birds, its apparent relation to which is shown by the name *Wood-Pheasant*, sometimes given to it; others with the hornbills and the hoatzin among the conirostres; others in the neighborhood of the thrushes; others with the wrens; and others with the pigeons. It is nearly the size of the common fowl, but is rendered remarkable by the structure of the feathers of the tail in the male. These are very long, and of three kinds. Twelve of them are furnished with slender distant barbs, which give them an exceedingly light appearance; two others, placed in the middle of the tail, are furnished with short close barbs only on one side, while the most striking feature of all is formed by the two external quill-feathers, which are very broad, and curved into the form of an elongated S, so arranged as to present a close resemblance in outline to the lyre of the ancients.

The bird is supported upon long and tolerably strong legs, terminated by feet which, except for the absence of membranes at the base of the toes, might easily be mistaken for those of a gallinaceous bird; and the lyre-bird runs upon the ground with great facility, and, in fact, in many

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of its habits bears no inconsiderable resemblance to many of the rasores. In other respects, however, it differs very widely from these. Its nest is a neat domed structure, composed of mosses, roots, and stems of plants; and when it is approached pretty closely, which, from its extreme shyness, is by no means an easy matter, it is found to possess a varied song. Both the species are found principally in the rocky gullies of New South Wales, where they run through the bush with such swiftness that, according to Mr. Gould, they are the most difficult to procure of all the birds of Australia. They fly but little, their wings being very short, and rounded.



ORDER 5. **RASORES.**

This order includes the numerous species of *Gallinaceous Birds*, or those which agree more or less in structure with our common fowl, and the name *Rasores*, or *Scrapers*, alludes to the habit of scratching in the ground in search of food, which is common with domestic poultry. They are generally marked by a small head, stout legs, the plumage firm, the males usually adorned with magnificent colors, and the tails often developed in a manner to render the appearance extremely elegant. The wings are usually short and weak, and the flight of the birds neither powerful nor prolonged. The stomach or gizzard is exceedingly muscular and strong, and lined with hard tendinous plates, by the action of which, assisted in most cases by stones, or other hard substances which the birds swallow, the comminution of the food is effected. The intestine is long, and furnished with very large cœca; the latter organs, in fact, are larger in these than in any other birds. The species are found in all parts of the world, from the tropics to the frozen regions of the north; but the finest and most typical kinds are inhabitants of the temperate and warmer parts of Asia. They feed principally on seeds, fruits, and herbage, but also, to a considerable extent, on insects, worms, and other small animals. Their general habitation is on the ground, where they run with great celerity, but many of them roost on trees. They are mostly polygamous in their habits, the males being usually surrounded by a considerable troop of females; and to these, with few a exceptions, the whole business of incubation is generally left. The nest is always placed on the ground in some sheltered situation, and very little art is exhibited in its construction; indeed, an elaborate nest is the less necessary, as the young are able to run about and feed almost as soon as they have left the egg; and at night, or on the approach of danger, they collect beneath the wings of their mother. Most of these species—including *Grouse*, *Partridges*, *Quails*, *Turkeys*, *Pheasants*, the *Common Fowls*, *Peacocks*, *Mound Birds*, *Curassows*, &c.—are esteemed for the table, and many of them are among the most celebrated of game birds.

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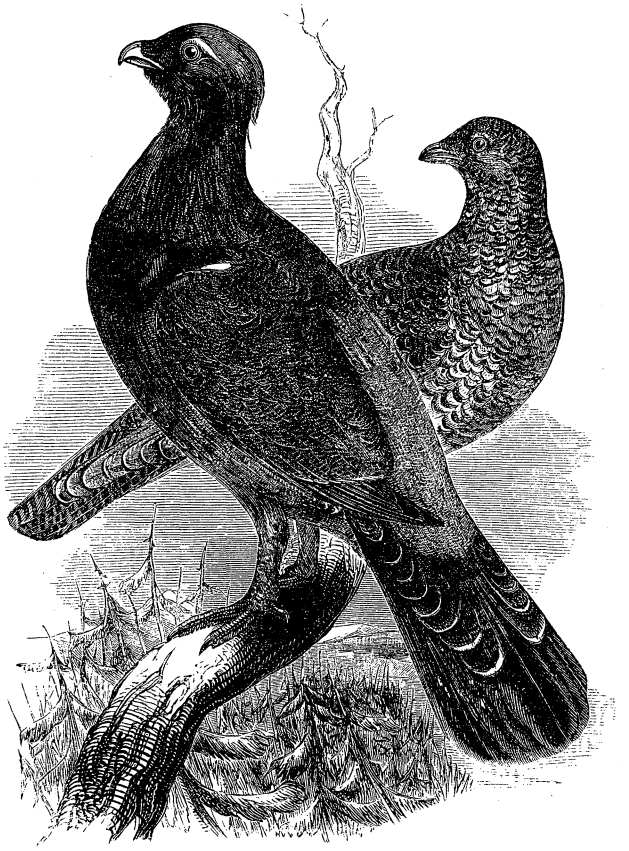
THE TINAMIDÆ AND CHIONIDIDÆ.

The *Tinamidæ* are South American birds resembling grouse, and living on the borders of woods or open grounds, and feeding on the grain-fields, chiefly at night. The nest is made in a tuft of herbage; the eggs are six to seven; the young run about as soon as hatched. There are several kinds: those of the genus *Tinamotis* are as large as a common fowl; other kinds do not exceed six inches in length. They are caught in large numbers with a noose at the end of a stick; the flesh is excellent.

The *Chionididæ* are found along the sea-shores of Australia, New Zealand, and the islands approaching the Antarctic Ocean. The WHITE SHEATH-BILL, *Chionis alba*, is the best known species; it is sixteen inches long, white, resembles the wading-birds, and feeds on mollusca; probably, also on carrion; its flesh is highly valued.

THE TETRAONIDÆ OR GROUSE.

These birds live principally on the ground, run with great swiftness, and feed almost entirely on vegetable substances, such as berries, seeds, and the buds of trees and shrubs. They are generally found in mountainous districts, some living on open heaths, and others in wooded regions. They vary greatly in size, some being nearly as large as a turkey, and others scarcely exceeding the dimensions of a pigeon.

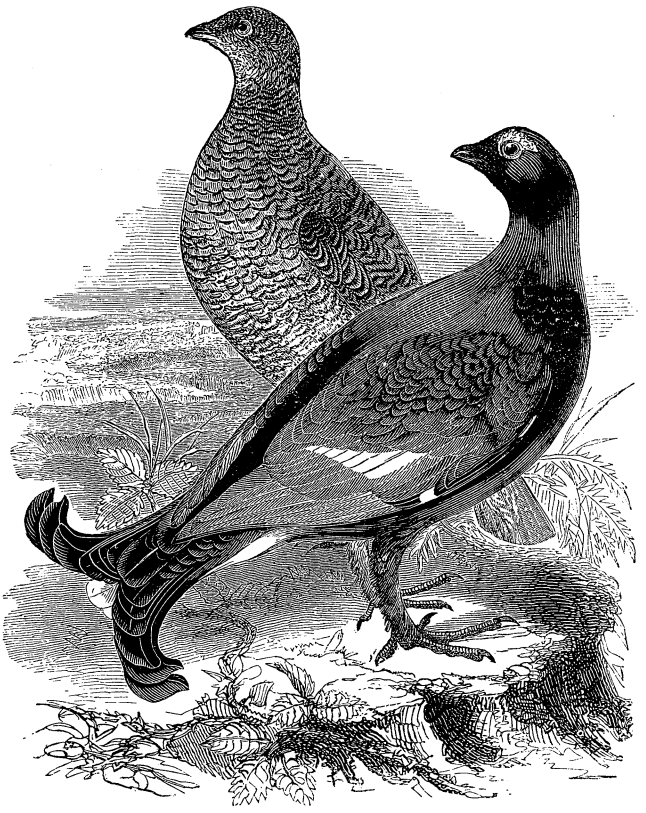


THE CAPERCAILLE.

Genus TETRAO: *Tetrao.*—The largest species is that of the CAPERCAILLE, WOOD-GROUSE, or COCK OF THE WOODS—*Coc de Bruyère* of the French—*T. urogallus:* it is three feet long; general color brownish-black, minutely freckled with grayish-white. Its favorite haunts are extensive woods, where it feeds on cranberries, blackberries, juniper-berries, buds of birch, and the leaves

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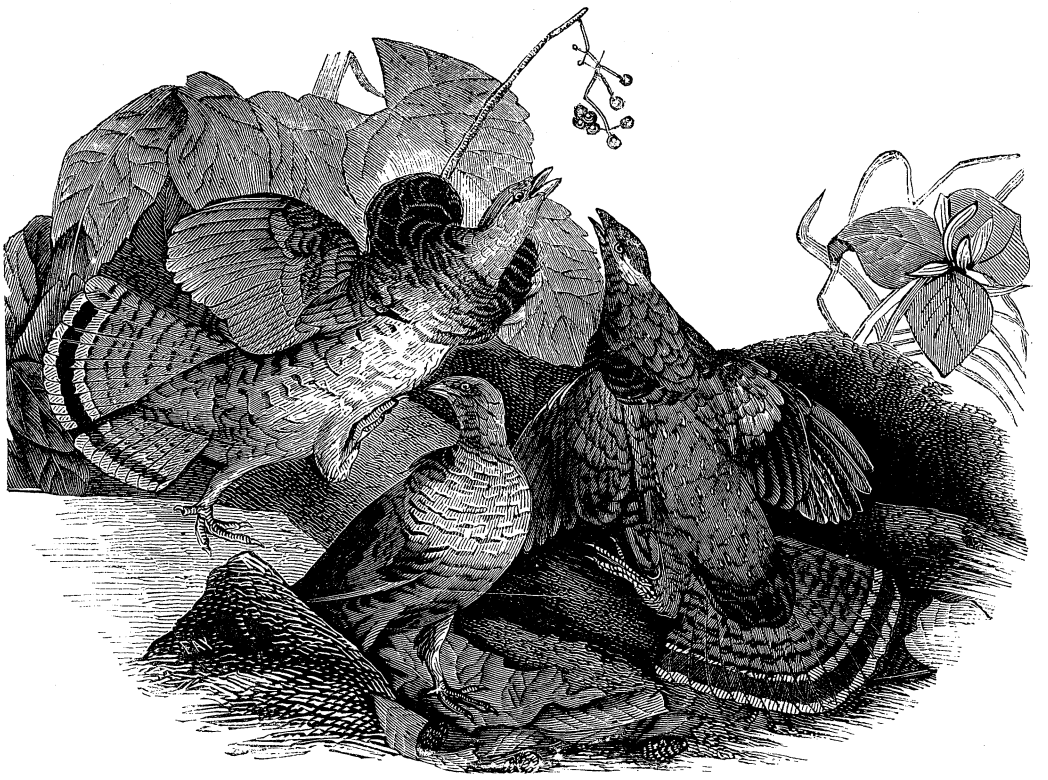
and tender shoots of fir. Early in the spring the cock has a habit of seating himself on a tree and beginning a love song, in which he cries out, *peller, peller, peller;* at the same time he raises and spreads his tail, lowers his wings, ruffles up his feathers, and in fact appears like a strutting turkey-cock. On hearing this call, the hens in the neighborhood croak like ravens, and at the same time gather around the cock, who now descends from his perch, and takes charge of the flock. The nest of this species is made on the ground, and the hen lays six to twelve eggs; the males now skulk away and leave the females to hatch and take care of the young. These birds are common in Sweden and other wooded portions of Northern Europe; they have become scarce in Scotland, where they were once abundant, though recent attempts to restock the woods have been partially successful. This bird has been occasionally domesticated, and has bred in that state; it has also bred with the black grouse.



BLACK GROUSE.

The Black Grouse or Black Cock, *T. tetrix*, is twenty-two inches long; general color black; it is partial to bogs and morasses, where the herbage is rank; in summer it feeds on seeds, leaves, and insects; in autumn on berries and the buds of trees. Like the preceding, it does not pair, but a male in the spring issues his call from some elevated spot, which is heard by the females, who assemble upon this invitation; the male now displays himself in various attitudes, spreading his tail and trailing his wings, and at last utters a crowing note, which may be heard for the distance of half a mile. These performances prove irresistible, and he becomes master of the flock. He remains with them, however, only till incubation begins, when he retires to the woods, and leaves the care of the several families to their respective mothers. These birds are abundant in Norway and Sweden, and the London market is chiefly supplied from this source through the winter; they are found throughout Northern and Middle Europe; in England and Scotland there are considerable numbers of them. Hybrids between this species and the pheasant have been frequently produced.

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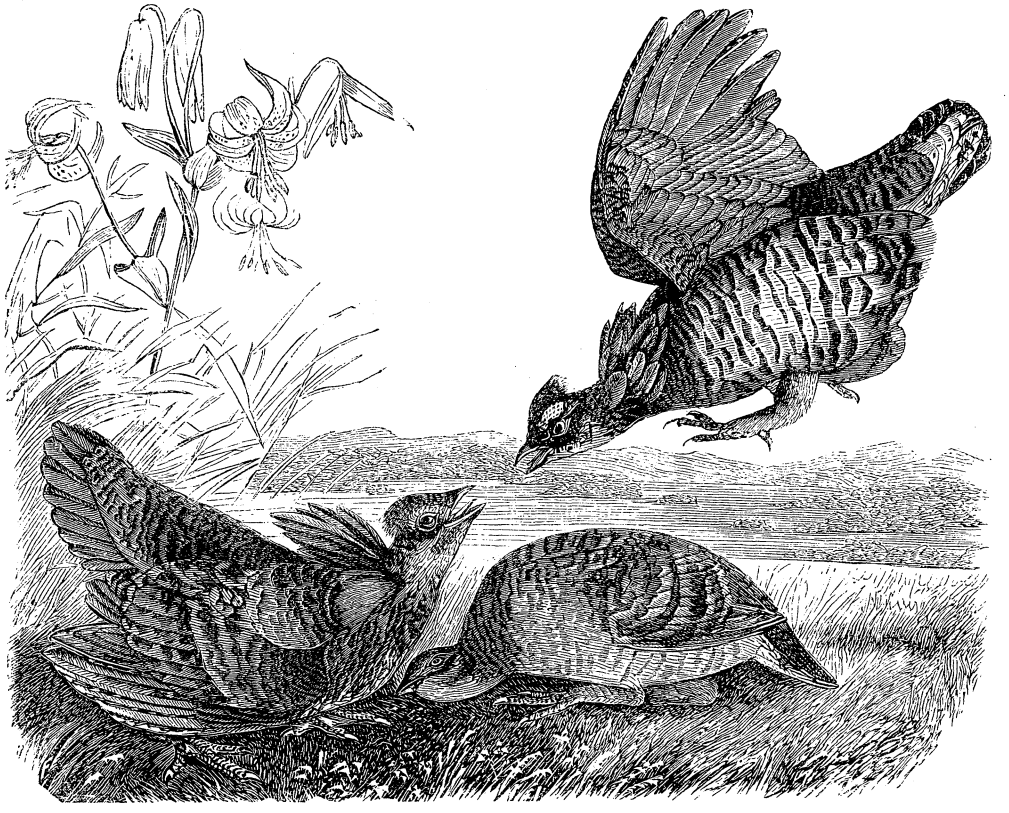
RUFFED GROUSE.

The Ruffed Grouse—*Partridge* of the Eastern States, and *Pheasant* of the Southern States—*T. umbellus*—the *Partridge Pheasant* of Audubon—*Bonasa umbellus* of Linnæus and others—is eighteen inches long; mottled with reddish and dusky brown; a crest of two tufts of feathers on the head; on each side of the neck a tuft of black feathers, concealing a naked space, these being occasionally raised, forming a distinct ruff. The female resembles the male, but the colors are paler, and the crest and ruff smaller. The food consists of whortleberries, blackberries, partridge-berries, seeds, chestnuts, grapes, ants, &c.; in winter they eat the buds of trees, and among them, those of the laurel. As the flesh is sometimes poisonous, it has been attributed to the effects of this food. These birds pair in April, and build their nest in May; this is of dry leaves and grass, placed in some sheltered situation; the eggs from nine to fifteen; the young leave the nest as soon as hatched, and follow the mother; if any person approaches them, they skulk in the briers and grass, and the old bird flutters and flounders as if her wing were broken, and induces the stranger to follow her. When she has drawn him to a safe distance, she takes wing, and leaves him in the lurch. Wilson relates an instance in which he surprised a hen partridge with only a single young one; to save this from capture, she seized it in her bill and flew off with it.

This fine bird is extensively distributed over the United States, and as far north as Hudson's Bay, being more abundant in high and mountainous countries, where it chooses its haunts on the declivities bordered by streams and covered with pine, hemlock, balsam, or other thick woods. Their flesh is greatly esteemed, and hence they are constantly pursued by trappers and gunners; though their numbers are reduced, still the markets of the cities are well supplied with them in winter. They are shy, and keep themselves concealed in the thick forest till a person approaches, when they suddenly burst away with a loud, whirring sound. Wilson says: "Their manners are solitary, and they are seldom found in coveys of more than four or five together, and more usually in pairs, or singly. They leave their sequestered haunts in the woods early in the morning, and seek the path or road, to pick up gravel, and glean among the droppings of the horses. In

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traveling among the mountains that bound the Susquehanna, I was always able to furnish myself with an abundant supply of these birds every morning, without leaving the path. If the weather be foggy or lowering, they are sure to be seen in such situations. They generally move along with great stateliness, their broad, fan-like tail spread out. The *drumming*, as it is usually called, is a singularity of this species. This is performed by the male alone. In walking through solitary woods frequented by these birds, a stranger is surprised by suddenly hearing a kind of thumping, very similar to that produced by striking two full-blown ox-bladders together, but much louder; the strokes at first are slow and distinct, but gradually increase in rapidity, till they run into each other, resembling the rumbling sound of very distant thunder, dying away gradually on the ear. After a few minutes' pause this is again repeated, and, in a calm day, may be heard nearly half a mile off. This drumming is most common in spring, and is the call of the cock to his favorite female. It is produced in the following manner: the bird, standing on an old, prostrate log, generally in a retired and sheltered situation, lowers his wings, erects his expanded tail, contracts his throat, elevates the two tufts of feathers on the neck, and inflates his whole body, something in the manner of the turkey-cock, strutting and wheeling about with great stateliness. After a few maneuvers of this kind, he begins to strike with his stiffened wings in short and quick strokes, which become more and more rapid until they run into each other, as has been already described. This is most common in the morning and evening, though I have heard them drumming at all hours of the day. By means of this, the gunner is often led to the place of his retreat; though, to those unacquainted with the sound, there is great deception in the supposed distance, it generally appearing to be much nearer than it really is."

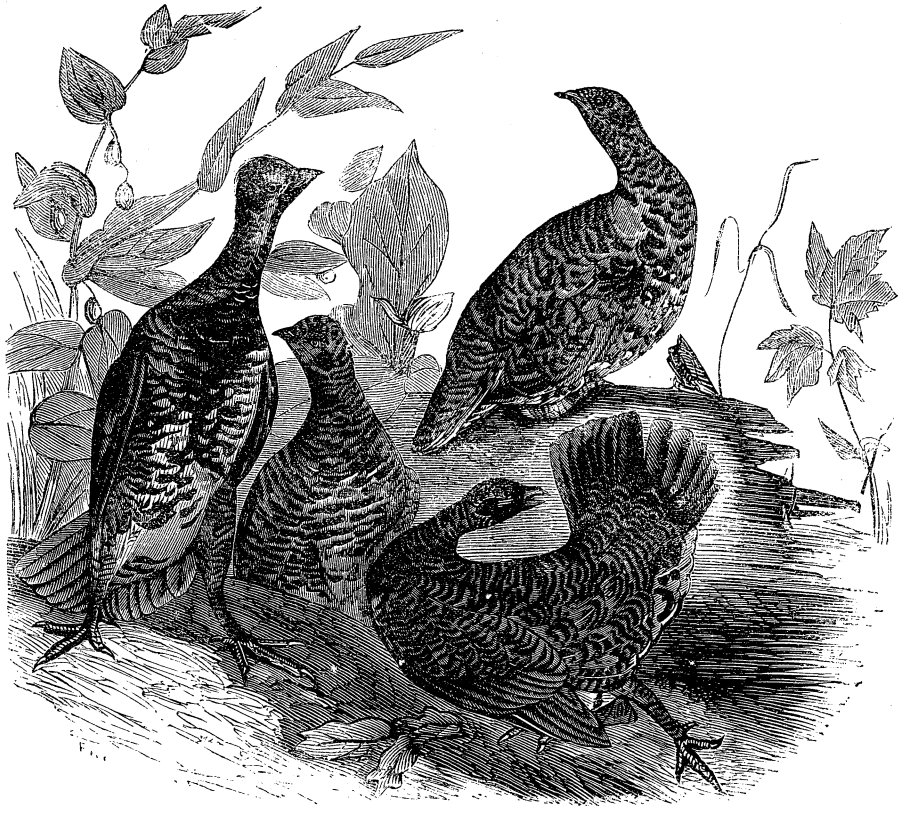


PRAIRIE HENS.

The PINNATED GROUSE—*T. cupido* of De Kay and others—*Cupidonia cupido* of Linnæus, Catalogue of the Smithsonian Institution, &c.—is eighteen inches long; blackish-brown, bounded with reddish, above; dark brown beneath; the eggs are eight to twelve, of a dull brown color; the

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male has a slight crest on the head, and a yellow wattle on each side of the neck like a small orange; this the bird is able to inflate with air, and thus to produce a curious tooting sound, which echoes through the woods, and is used as the call to the female. When the tooting is over these bladders become relaxed. Audubon found, on perforating them with a pin, that they could no longer be inflated. This species goes under the names of *Prairie-Hen* and *Heath-Hen*, besides that given at the head of this article. It feeds on grasshoppers, wheat, and Indian corn, which it gathers in the fields, seeds of various kinds, and buds of trees. Their haunts are among fields and grounds covered with bushes or shrub-oaks. One of their habits is thus described by Dr. Mitchell in Wilson's Ornithology: "During the period of mating, and while the females are occupied in incubation, the males have a practice of assembling, principally by themselves. To some select and central spot, where there is very little underwood, they repair from the adjoining district. From the exercises performed there, this is called a *Scratching-place*. The time of meeting is the break of day. As soon as the light appears, the company assembles from every side, sometimes to the number of forty or fifty. When the dawn is passed, the ceremony begins with a low tooting from one of the cocks; this is answered by another. They then come forth one by one from the bushes, and strut about with all the pride and ostentation they can display. Their necks are incurvated; the feathers on them are erected into a sort of ruff; the plumes of their tails are expanded like fans; they strut about in a style resembling, as nearly as small may be illustrated by great, the pomp of the turkey-cock. They seem to vie with each other in stateliness; and, as they pass each other, frequently cast looks of insult, and utter notes of defiance. These are the signals for battles. They engage with wonderful spirit and fierceness, leaping a foot or two from the ground, and uttering a cackling, screaming, and discordant cry."



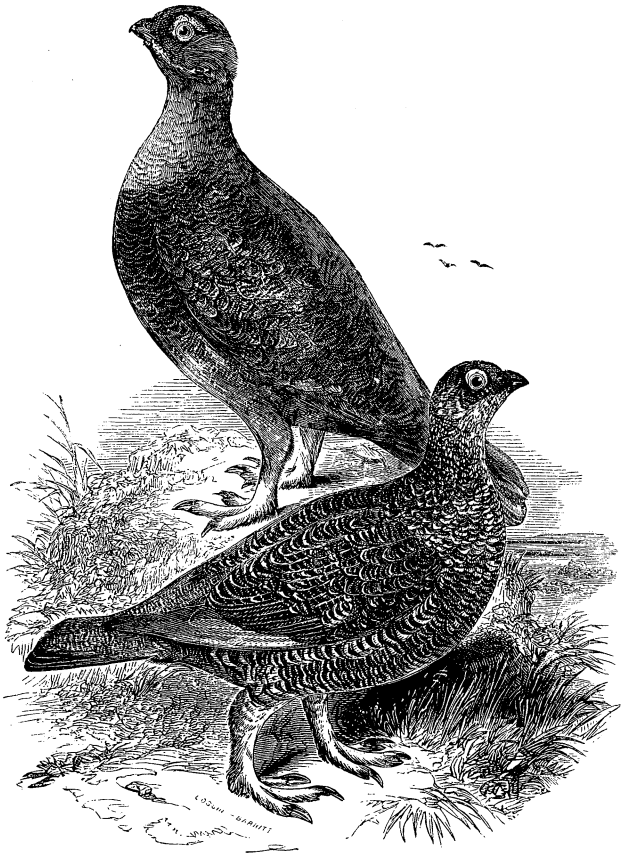
CANADA GROUSE.

The Heath-hen was formerly abundant throughout the United States; a few only are now found in the Eastern States; they are still common in the West, where they were formerly so numer-

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ous as to be a pest to the farmers; the markets of the cities are well supplied with them in the winter season. Their flesh is excellent, and they can be tamed with facility.

Other American species of grouse are the SPOTTED, SPRUCE, or CANADA GROUSE, *T. Canadensis*, fifteen inches long; found from the State of New York to Labrador: the DUSKY GROUSE, *T. obscurus*, twenty-two inches long; the male with neck-sacks like those of the pinnated grouse; found in the Rocky Mountains and on the Columbia River: the PHEASANT-TAILED GROUSE, or COCK OF THE PLAINS, *T. urophasianus*—*Centrocercus urophasianus* of Bonaparte—thirty inches long; found in the same localities as the preceding: the SHARP-TAILED GROUSE, *T. phasianellus*—*Pedioecetes phasianellus* of Bonaparte—seventeen and a half inches long; found in the Fur Countries.

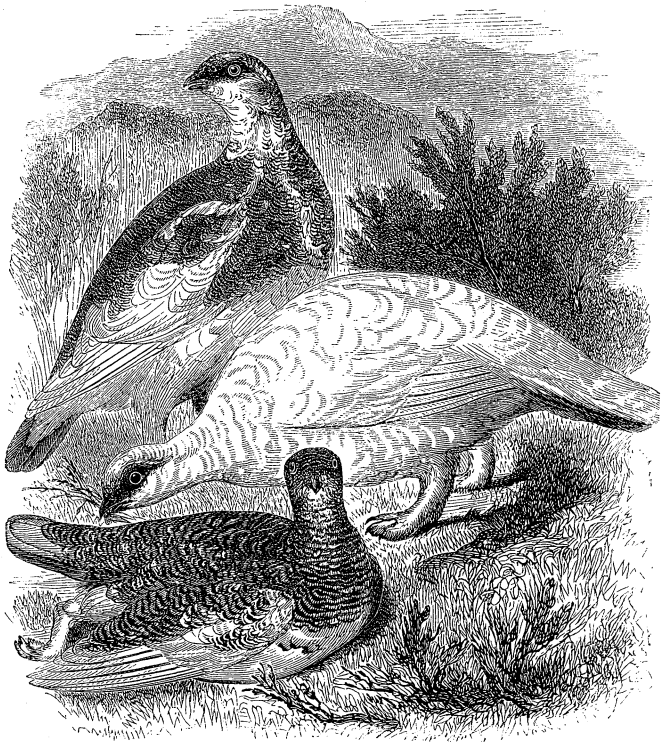


RED GROUSE.

Genus LAGOPUS: *Lagopus*.—To this belongs the RED GROUSE, *L. Scoticus*, sixteen inches long; general color rufous-brown. This species, as well as the ptarmigan, differs from the preceding in pairing every spring, and in being feathered down to the toes. It lives chiefly on the moors, and hence is often called *Moor-Fowl*. It is confined to the British Islands and the Orkneys, and is a very prolific species, affording abundant occupation to the sportsman in the game season; forty brace are sometimes bagged by one man in a day. The supplies in the London market are constant from August to March. Most of these birds are shot, but many are taken by horse-hair snares. They vary in the different counties of England and Scotland; in the county of Durham a cream-colored variety is found. This species are often bred in confinement.

The PTARMIGAN or WHITE GROUSE, *L. vulgaris*, is fifteen inches, general color gray in summer; white in winter; feeds on Alpine seeds and berries, and the tender shoots of plants; pairs in early spring; lays eight to ten yellowish-white eggs, often among stones on the bare ground. It

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PTARMIGANS.

has little sagacity, but owes its safety chiefly to being of the same color as the rocks and lichens among which it is found. It is met with in the mountainous countries of Europe from Italy to Scandinavia. It is also said to have been found in Greenland and in North America; but this is thought by Audubon to be erroneous. Beside great numbers sent to the London market from different parts of the British Islands, game dealers from this metropolis visit Norway and Sweden in the winter, and take away almost incredible quantities of these birds. In 1840 we are told that in one week a single poulterer in Leadenhall market received fifteen thousand ptarmigan, which had been consigned to him; another dealer, during the same period, received seven hundred capercailles and five hundred and sixty black grouse.

Two other species of grouse are found in Norway, the DAL-RIPA of Scandinavia—*Tetrao subalpina* of Nilsson—*T. saliceti* of Temminck; the WILLOW GROUSE, *L. albus*, of Audubon; the WHITE GROUSE of Baird, and a smaller species, *L. alpina*, which Yarrell regards as the Common Ptarmigan, *L. vulgaris*. The former is seventeen inches long; variegated with black, chestnut, and white above; below pure white. In America, it is found from Maine to the Fur Countries; abundant in Labrador.

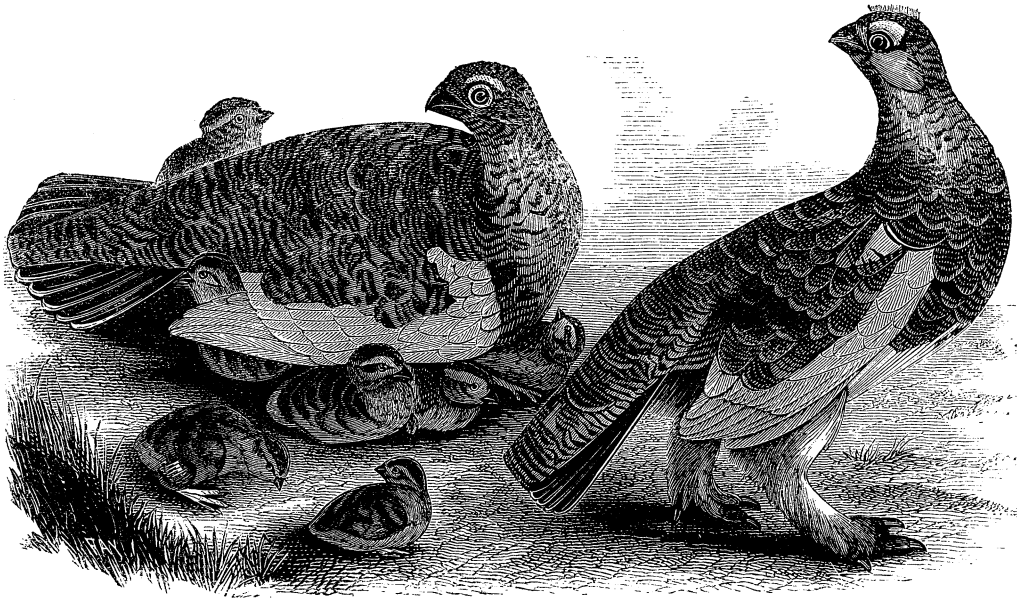
The AMERICAN PTARMIGAN—*L. Americanus* of Audubon—is fourteen and a half inches long; color pure white; found in the northern parts of North America. It has been mistaken for the *L. vulgaris* of Europe.

The ROCK PTARMIGAN, *L. rupestris*, resembles the Willow Grouse, but is smaller, being thirteen and a half inches long. Its winter plumage is white. It is abundant, and migrates from Labrador to the Arctic Seas; Richardson says it is known in Sweden under the name of *Sno Rissa*.

The WHITE-TAILED PTARMIGAN, *L. leucurus*, is twelve inches long; above variegated with blackish-brown, wood-brown, and brownish-white; beneath pale ocher; found in the Rocky Mountains.

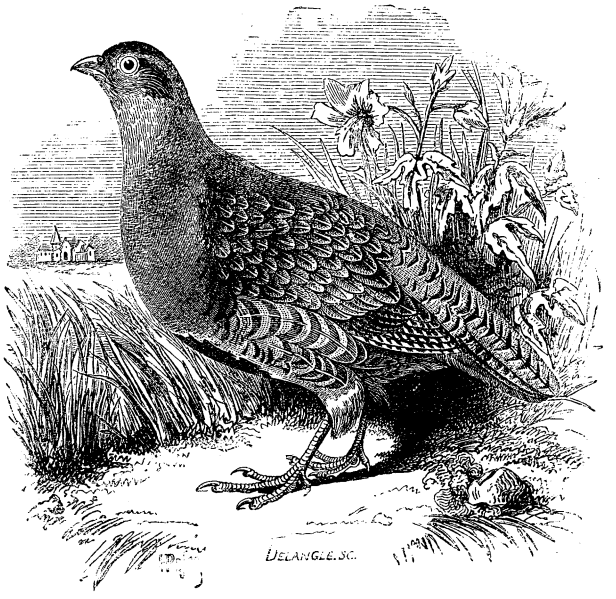
The Catalogue of the Smithsonian Institution has also FRANKLIN'S GROUSE, *Tetrao Franklinii*; GRAY MOUNTAIN GROUSE, *Bonasa umbelloides*; and OREGON GROUSE, *B. Sabinii*.

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WILLOW GROUSE.

Genus SYRRHAPTES: *Syrrhaptes.*—Of this is *S. paradoxus;* found in the steppes of Bokhara; it has a short but rapid flight; lays four or five eggs, and lives on grain and seeds. There are several other foreign species in Africa and Asia, together with a family called *Sand-Grouse*, ranged under the generic name of *Pterocles;* two species of which, *P. arenarius*, and *P. alchata*, are found in southern Europe.

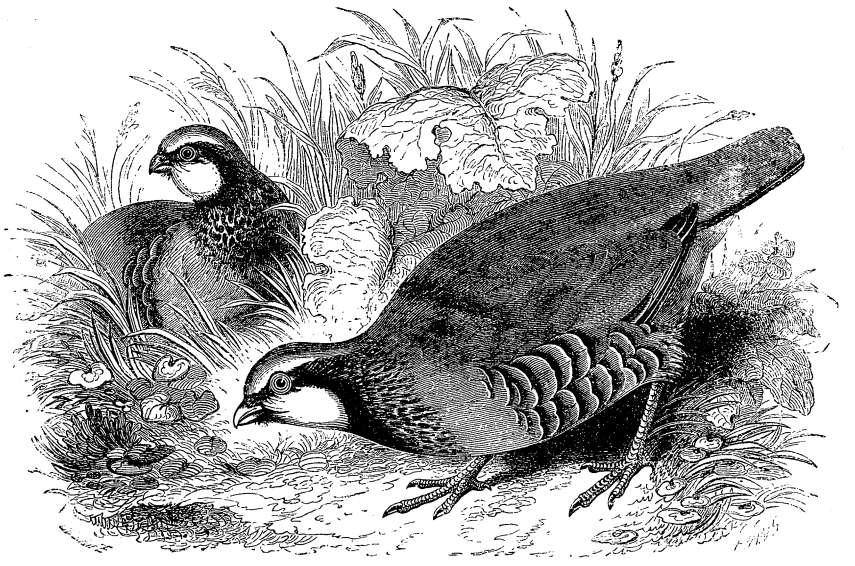


THE COMMON PARTRIDGE OF EUROPE.

PERDICINÆ OR PARTRIDGES.

Under this head we shall notice several groups of birds, some belonging to the Eastern and some to the Western Hemisphere, which bear the general names of *Partridges* and *Quails*, though they comprise several distinct genera.

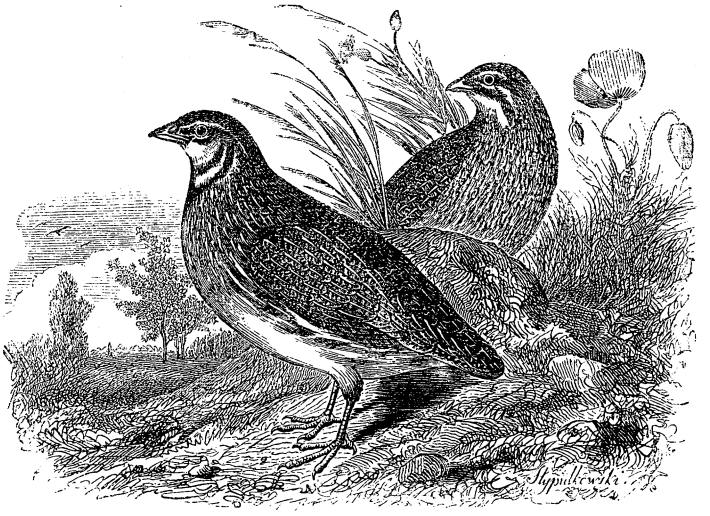
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THE RED-LEGGED PARTRIDGE.

Genus PERDIX: *Perdix.*—The COMMON PARTRIDGE OF EUROPE, or GRAY PARTRIDGE, *P. cinerea*, is twelve inches long, and is nearly twice the weight of our common quail; variegated with two shades of chestnut-brown and wood-brown above, and chestnut-white, and yellowish-white beneath; varieties of color are, however, common. The nest is usually made among brushwood or long grass; the eggs twelve to twenty-five. The female displays the utmost care and affection for her nest and eggs; when the young are hatched the male unites with the female, and both exercise the greatest care over the brood. Their haunts are chiefly in the grain fields; their food consists of grain and seeds, tender herbage and insects. This is one of the favorite game birds in England; as many as eighty brace having been bagged in one day by a single sportsman. The species is common throughout Europe, where it is, for the most part stationary. It is also found in Asia and Africa.

The RED-LEGGED OR GUERNSEY PARTRIDGE, *P. rubra*, is thirteen inches long, and is common



EUROPEAN QUAILS.

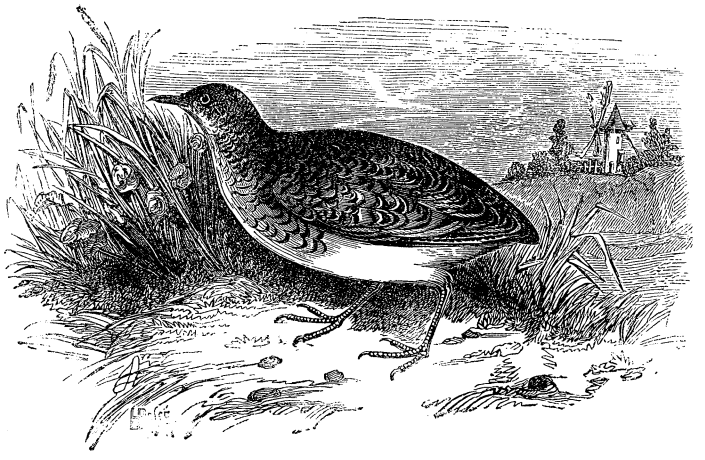
in the South of Europe. The BARBARY PARTRIDGE, *P. petrosa*, is closely allied to the preceding; it is thirteen inches long, and is found in Northern Africa and portions of Southern Europe.

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The FRANCOLIN, or FRANCOLIN PARTRIDGE, *P. Francolini*, or *Francolinus vulgaris*, is eleven inches long, and resembles the other partridges; found along the shores of the Mediterranean.

THE EUROPEAN QUAILS, &c.

Genus COTURNIX: *Coturnix.*—To this belongs the bird which in England is called QUAIL; in France *Caille*—*C. vulgaris.* It is about two-thirds the size of our New England quail; is seven inches long; general color brown, above; yellowish-white below. The males are polygamous; the nest is on the ground; the eggs seven to twelve. It has a call or whistle of three notes—*peet, wheet, wheet.* This bird is migratory, crossing the Mediterranean from Africa in April and returning in autumn. Like many other weak and timid birds, they fly mostly by night, to avoid hawks and other enemies; but millions are annually taken by sportsmen and trappers on the rocky islands of the Mediterranean, where they stop to rest, in their migrations. Their flesh is much esteemed. This species is very widely distributed in Asia, Africa, and Europe, and it is probably the same as the quails with which the Israelites were fed in the wilderness.



THE ANDALUSIAN QUAIL.

The ANDALUSIAN QUAIL or HEMIPODE, *Hemipodius tachydromus* or *Turnix tachydromus*, is five inches long, and is found in Spain, in the north of Africa, and in Sicily.

The FIGHTING QUAIL, *Hemipodius pugnax*, is five and a half inches long; it is a native of Java, and is trained like the cock for the pit, quail-fighting being a great amusement with the Javanese.

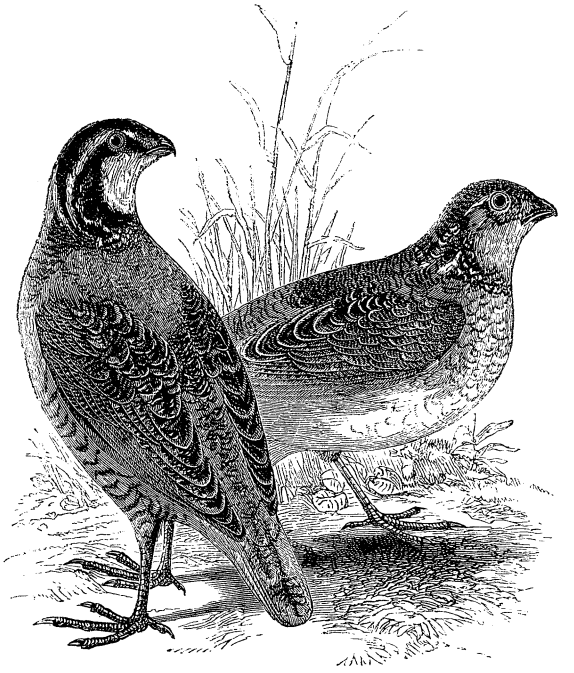
AMERICAN QUAILS OR PARTRIDGES.

Under this head we shall notice several American birds popularly called quails as well as partridges.

Genus ORTYX: *Ortyx.*—To this belongs the COLIN or QUAIL of New England and PARTRIDGE of the South, *O. Virginianus.* It is, strictly, neither a quail nor a partridge, but partakes of the nature of both. It is nine inches long; upper part of the body reddish-brown, variously striped; bluish-white, striped and barred with reddish-brown; its nest is on the ground; the eggs twelve to eighteen; the food grains, seeds, and berries; they live in coveys of a dozen or more. In the spring the male has a sharp, sonorous whistle, variously interpreted as *more wet, bob white,* and *buck wheat.* Its flesh is delicious, and it is eagerly pursued as a game bird. It rises suddenly on the wing with a whirring sound, usually alighting on the ground, sometimes on trees. It ranges from Honduras to northern New England. It is a beautiful bird, and various attempts have been made to cultivate it, but without success. Several have been shot in England, but doubtless these were birds carried thither; a considerable number have been taken to that country and let loose, but they appear not to have bred to any extent.

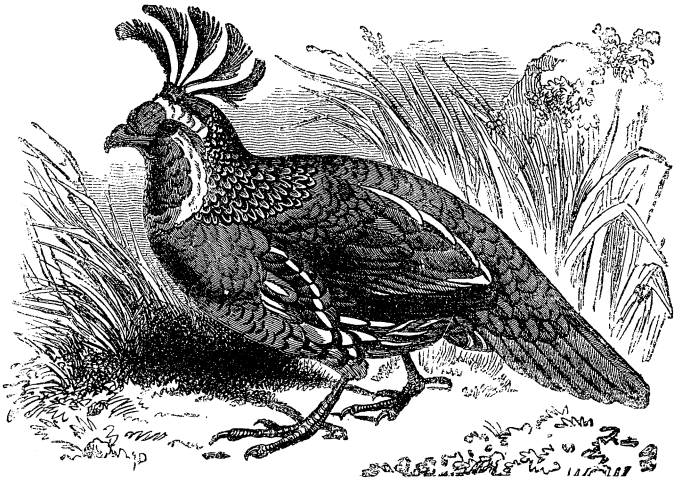
The CALIFORNIAN QUAIL or PARTRIDGE, *Lophortyx Californicus*, is a beautiful species, nine and a quarter inches long, with an elegant crest of six long feathers on the head; found in Cali-

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AMERICAN QUAILS.

fornia. The PLUMED PARTRIDGE, *Oreortyx pictus*, is also a very beautiful bird, with two long plumes on the head; found in California. The WELCOME QUAIL or PARTRIDGE, *Ortyx neoxenus*, is seven and a half inches long; found on the northwest coast of America. The MASSENA PARTRIDGE, *Cyrtonyx Massena*, is found in Texas and Mexico. GAMBEL'S PARTRIDGE, *Callipepla*



THE CALIFORNIA PARTRIDGE.

Gambellii of Cassin; and the BLUE or SCALED PARTRIDGE, *C. squamata*, are found in Texas and Mexico. The *Ortyx Texanus* is found in Southern Texas and the valley of the Rio Grande.

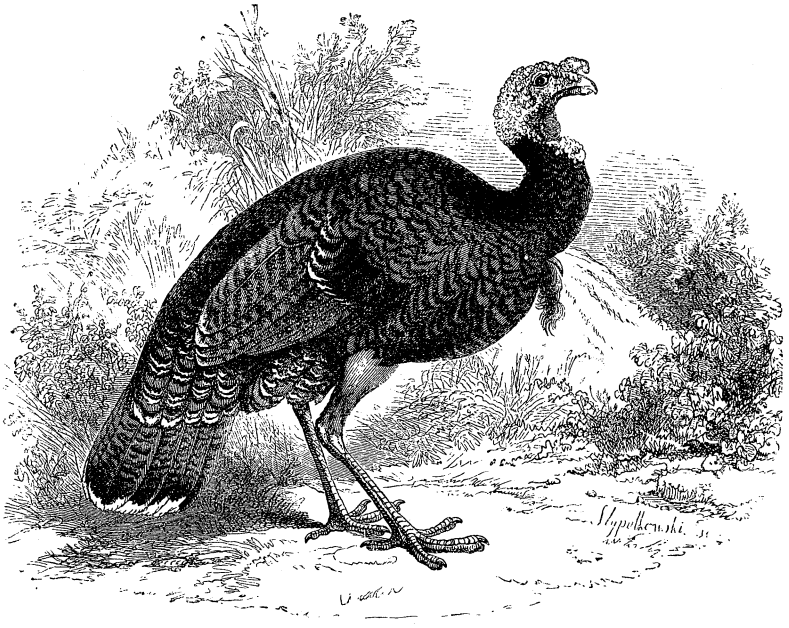
THE PHASIANIDÆ OR PHEASANTS.

This family includes the most beautiful of the rasorial birds; indeed, some of them may perhaps be justly regarded as pre-eminent in this respect over all the rest of their class. In these the bill is of moderate size and compressed, with the upper mandible arched to the tip, where it overhangs the lower one; the tarsi are of moderate length and thickness, usually armed with one

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or two spurs; the toes are moderate, and the hinder one short and elevated; the wings are rather short and rounded, and the tail more or less elongated and broad, but frequently wedge-shaped and pointed. The head is rarely feathered all over; the naked skin is sometimes confined to a space about the eye, but generally occupies a greater portion of the surface, occasionally covering the whole head, and even a part of the neck, and frequently forming combs and wattles of very remarkable forms. In some species the crown is furnished with a crest of feathers.

The birds of this family are for the most part indigenous to the Asiatic continent and islands, from which, however, several species have been introduced into other parts of the globe. The Guinea-Fowl of Africa, and the Turkeys of America, are almost the only instances of the occurrence of wild Phasianidous birds out of Asia. Some species, such as the Common Fowl, the Peacock, the Turkey, and the Guinea-Fowl, have been reduced to a state of complete domestication, and are distributed pretty generally over the world.



THE TURKEY.

THE MELEAGRINÆ OR TURKEYS.

Under this head we include the *Turkeys* and the *Guinea-Fowl.*

Genus MELEAGRIS: *Meleagris.*—To this belongs our Common Wild Turkey, *M. gallopavo* —*Dindon* of the French—now known as a domestic fowl in most civilized countries, but which was confined to America until after its discovery by Columbus; it was probably introduced into Europe by the Spaniards about the year 1530. It was found in the forests of North America from the Isthmus of Darien to Canada when the country was first settled, being then abundant even in New England; at present a few are found in the mountains of Massachusetts, New York, and New Jersey; in the Western and Southwestern States they are still numerous, though constantly diminishing before the extending and increasing settlements. The wild male bird is three to four feet long, and weighs from fifteen to forty pounds; its color is black, glossed with purple and bronzed green; the head and neck are covered with a bare carunculated skin, and at the base of the bill there is a singular fleshy appendage, which is usually of considerable length. The breast is ornamented with a tuft of long black wiry hair.

The habits of these birds in their native wilds are exceedingly curious. The males, called *Gobblers*, associate in parties of from ten to a hundred, and seek their food apart from the females, which either go about singly with their young, at that time about two-thirds grown, or form troops with other females and their families, sometimes to the amount of seventy or eighty.

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COCK TURKEY.

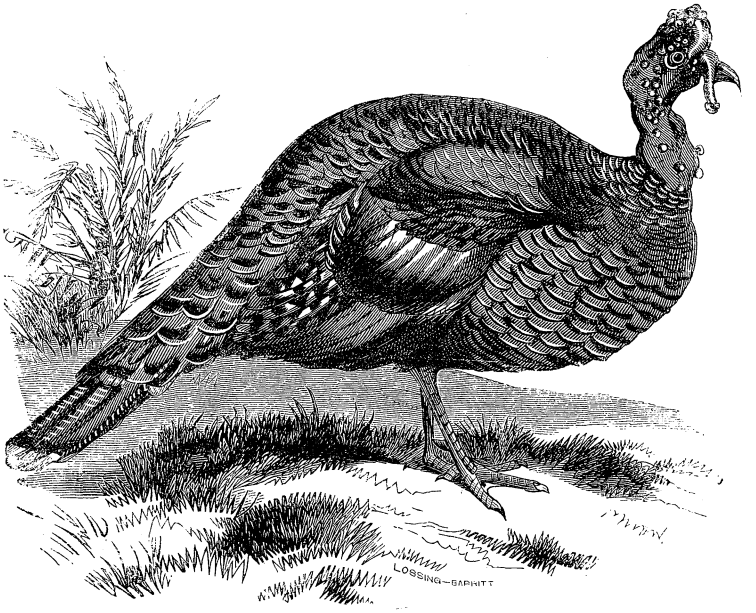
These all avoid the old males, who attack and destroy the young, whenever they can, by reiterated blows on the skull. But all parties travel in the same direction, and on foot, unless the dog of the hunter or a river in their line of march compel them to take wing. When about to cross a river they select the highest eminences, that their flight may be more sure, and in such positions they sometimes stay for a day or more, as if in consultation. The males upon such occasions gobble obstreperously, strutting with extraordinary importance, as if to animate their companions; and the females and young assume much of the pompous air of the males, and spread their tails as they move silently around. Having mounted, at length, to the tops of the highest trees, the assembled multitude, at the signal note of their leader, wing their way to the opposite shore. The old and fat birds, contrary to what might be expected, cross without difficulty, even when the river is a mile in width; but the wings of the young and meager, and of course those of the weak, frequently fail them before they have completed their passage, when in they drop, and are forced to swim for their lives, which they do cleverly enough, spreading their tails for a support, closing their wings, stretching out their necks, and striking out quickly and strongly with their feet. All do not succeed in such attempts, and the weaker often perish.

The wild turkeys feed on maize, all sorts of berries, fruits, grasses, and beetles; tadpoles, young frogs, and lizards, are also occasionally found in their crops. The pecan-nut is a favorite food, and so is the acorn, on which last they fatten rapidly. About the beginning of October, while the mast still hangs on the trees, they gather together in flocks, directing their course to the rich bottom-lands, and are then seen in great numbers on the Ohio and Mississippi. This is the *Turkey-Month* of the Indians. When the turkeys have arrived at the land of abundance, they disperse in small promiscuous flocks of every sex and age, devouring all the mast as they advance. Thus they pass the autumn and winter, becoming comparatively familiar after their journeys, and then venturing near plantations and farm-houses. They have been known on these occasions to enter stables and corn-cribs in search of food. Numbers are killed in the winter, and are preserved in a frozen state for distant markets. The beginning of March is the pairing period, for a short time previous to which the females separate from their mates, and shun them, though the latter pertinaciously follow them, gobbling loudly. The sexes roost apart, but at no great distance, so that

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when the female utters a call, every male within hearing responds, rolling note after note in the most rapid succession; not as when spreading the tail and strutting near the hen, but in a voice resembling that of the tame turkey when he hears any unusual or frequently repeated noise. Where the turkeys are numerous, the woods, from one end to the other, sometimes for hundreds of miles, resound with this remarkable voice of their wooing, uttered responsively from their roosting places. This is continued for about an hour; and, on the rising of the sun, they silently descend from their perches, and the males begin to strut for the purpose of winning the admiration of their mates. If the call of a female be given from the ground, the males in the vicinity fly toward the individual, and, whether they perceive her or not, erect and spread their tails, throw the head backward, distend the comb and wattles, strut pompously, and rustle their wings and body-feathers, at the same moment ejecting a puff of air from the lungs. While thus occupied, they occasionally halt to look out for the female, and then resume their strutting and puffing, moving with as much rapidity as the nature of their gait will admit. During this ceremonious approach, the males often encounter each other, and desperate battles ensue, when the conflict is only terminated by the flight or death of the vanquished. The usual fruits of such victories are reaped by the conqueror, who is followed by one or more females, which roost near him, if not upon the same tree, until they begin to lay, when their habits are altered, with the view of saving their eggs, which the male breaks if he can get at them. These are usually from nine to fifteen in number, sometimes twenty, whitish, and spotted with brown like those of the domestic bird. The nest consists of a few dried leaves placed on the ground, sometimes on a dry ridge, sometimes in the fallen top of a dead leafy tree, under a thicket of sumach or briers, or by the side of a log. The females are particularly attentive to their young.

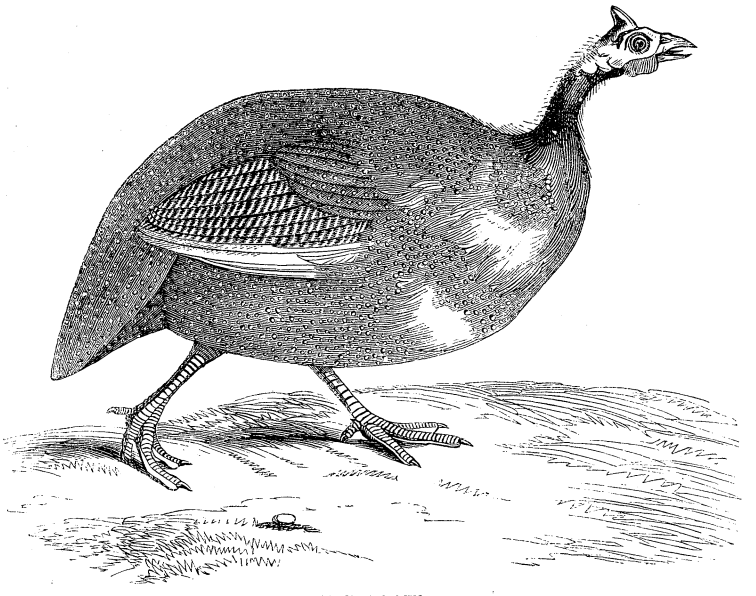
The habits of the domestic turkey are well known; the common effect of domestication in changing the colors of birds, as well as other animals, is conspicuous in this species, there being various mixtures of buff, black, and white. The flesh of this species ranks among the best of domestic fowls, and immense numbers of them are produced, especially in the United States.



THE HONDURAS TURKEY.

The Honduras or Ocellated Turkey, *M. Mexicana*, is a beautiful species, nearly as large as the preceding, recently discovered in Central America; the plumage is of a lustrous coppery-green, each tail-feather being furnished with a blue eye-spot, surrounded by a black ring. Specimens have recently been presented to the London Zoological Gardens.

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GUINEA-FOWL.

Genus NUMIDA: *Numida.*—This includes the GUINEA-FOWL or PINTADO, *N. meleagris*, now common in our poultry-yards; it is indigenous to the tropical parts of Africa; it is somewhat larger than the common fowl, of a bluish gray color, and covered with small, round, white spots. It is a restless, noisy bird, frequently uttering a harsh, ringing cry of *ca-mac, ca-mac.* It is said this cry will frighten crows away from the vicinity where these birds are kept. Their flesh is excellent, and the eggs, which they produce abundantly, are much valued. In a wild state they live in flocks, in woods, preferring marshy places, and feed on insects, worms, and seeds; they roost on trees; the nest is made on the ground, and usually contains as many as twenty eggs. They have been propagated in the Island of Jamaica to such an extent as to have become wild, and are shot like other game. They do much damage to the crops, and are therefore destroyed by various means, one of which is to get them tipsy by strewing corn steeped in rum, and mixed with the intoxicating juice of the cassava, upon the ground; this the birds devour, and are soon found in a helpless state of inebriety.

The CRESTED PINTADO, *N. cristata*, is smaller than the preceding; color bluish-black, spotted with gray; found in Western Africa. Another species is called *N. maculipennis.*

THE PHASIANINÆ OR TRUE PHEASANTS.

These are among the most brilliant and beautiful of the feathered tribes; there are several species, all originally confined to Asia, but many of them now domesticated in Europe.

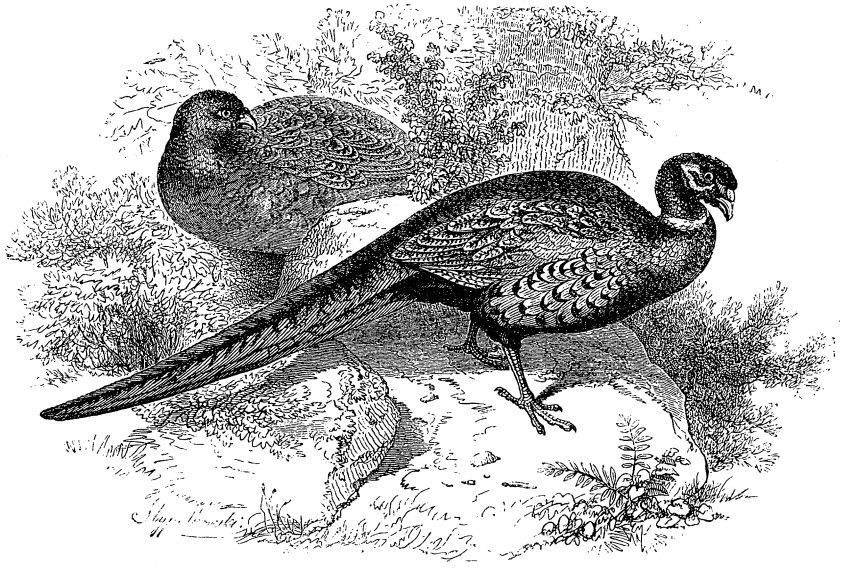
Genus PHASIANUS: *Phasianus.*—The best known species is the COMMON PHEASANT of Europe. This is a native of western Asia, and is supposed to have been originally introduced into Europe from the banks of the *Phasis*, a river of the ancient kingdom of Colchis, situated at the eastern extremity of the Black Sea, and from this locality its scientific name is derived. It is now, however, very generally distributed over the whole of the southern parts of Europe. It is abundant in the parks of England, where it is carefully protected by game laws, and is only allowed to be shot at particular seasons, and by persons duly authorized by the proprietors. Groups of these superb birds are seen in the English preserves, almost as common as domestic fowls. The cock pheasant, including his long and beautiful tail, is thirty-four inches long; the general color above is chestnut-brown, shaded with red; the head and neck steel blue, reflecting brown, green, and purple, in different lights; the breast and belly are golden red. No description, however, can give any idea of the effect of the rich colors, beautifully distributed, in spots, lines, and patches of various graceful forms.

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The description of the habits of the common pheasant will serve, with little variation, for the whole group. Its favorite haunts are woods and thickets, always in the neighborhood of water, and it frequently takes to marshy islands, overgrown with rushes or osiers. In the summer the pheasants roost on the ground, but during the latter part of the autumn and winter they pass the night upon trees. They feed upon grain and seeds of various kinds, intermixed with fruits, blackberries, sloes, haws, acorns, green herbage, roots, and insects. In their movements they closely resemble the common fowl, walking and running in the same manner, and with great swiftness—in fact, rarely taking wing unless pressed with immediate danger. They are polygamous, and the males and females only associate during the breeding season, which is in the spring. At this time the males, which have kept together during the winter, separate, each taking up a particular station, where he collects a number of females round him, by strutting about, clapping his wings, and crowing. The females deposit from ten to fourteen eggs among long grass or bushes, the nest consisting merely of a small hollow lined with dried leaves; they are then deserted by the male, and the whole labor of incubation and bringing up the young brood is left entirely to them. In



THE COMMON PHEASANT OF EUROPE.

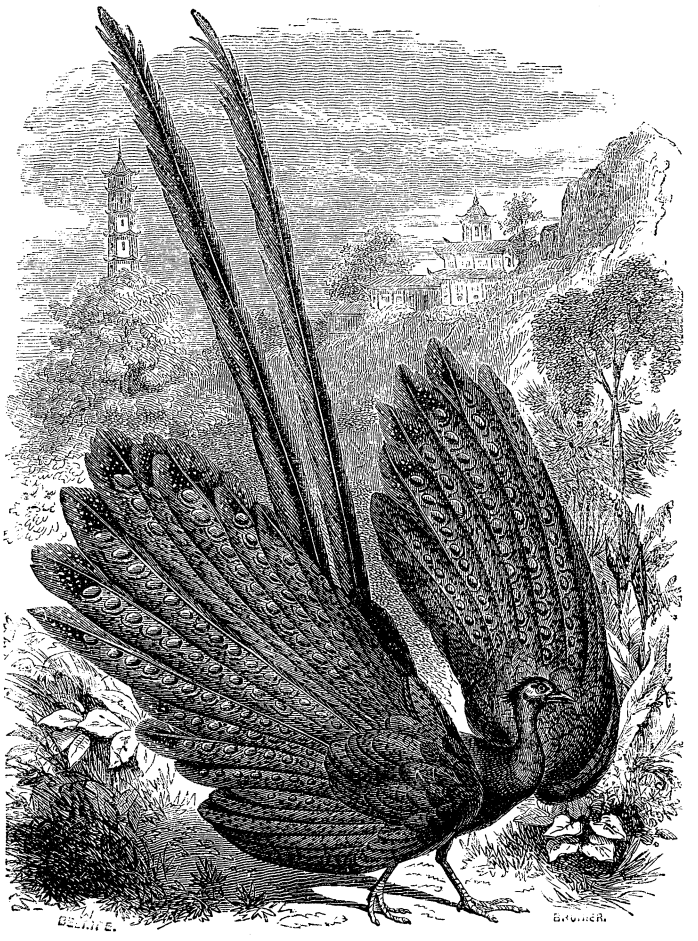


THE RING-NECKED PHEASANT.

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captivity the pheasant will breed with the common fowl and guinea-fowl, and in a wild state hybrids of these with the black grouse have been met with.

The Ring-necked Pheasant, *P. torquatus*, is a Chinese species, twenty-nine inches long, and marked by a white band around the neck. The Golden Pheasant, *P. pictus*, and the Silver Pheasant, *P. nycthemerus*, are exceedingly brilliant and beautiful; they are found wild in China, and are common in European countries in a domestic state.



THE ARGUS PHEASANT.

Genus ARGUS: *Argus.*—To this belongs the Argus Pheasant, *A. giganteus*, surpassing in size and splendor all the other species. It is more than five feet long, and is remarkable for the length of the secondary quill feathers of the wings, which often exceed two feet in length; being adorned with a series of ocellated spots along their whole length, they give the bird an indescribable magnificence when the wings are expanded. It is a native of Sumatra and India.

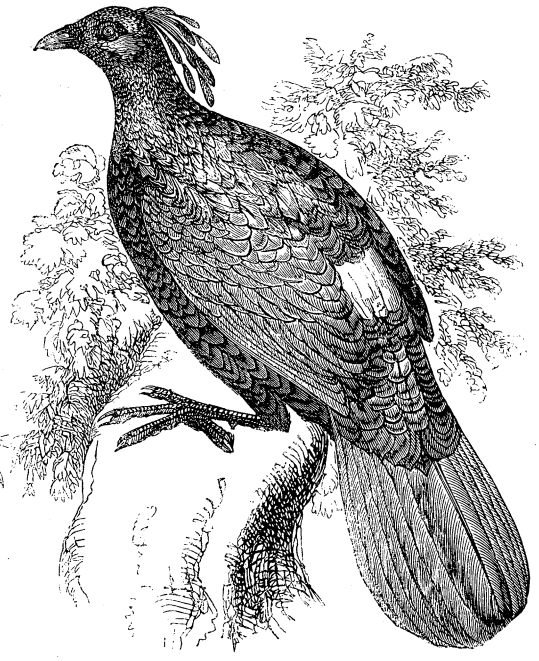
Among the other species of these elegant birds are the Impeyan Pheasant, *Lophophorus Impeyanus*—size of a hen turkey, and found in Nepaul—and Hastings' Tragopan, *Tragopan Hastingsii*, from the northern range of the Himalaya Mountains. The latter is distinguished by a crest, and two fleshy horns rising from the back of the head; a mass of fleshy wattles cover the under part of the neck. The habits of these birds resemble those of other pheasants.

Genus GALLUS: *Gallus.*—This includes the Common Fowl, *Gallus domesticus*, the most valuable of all birds to man. This has been under his protection from time immemorial; and the

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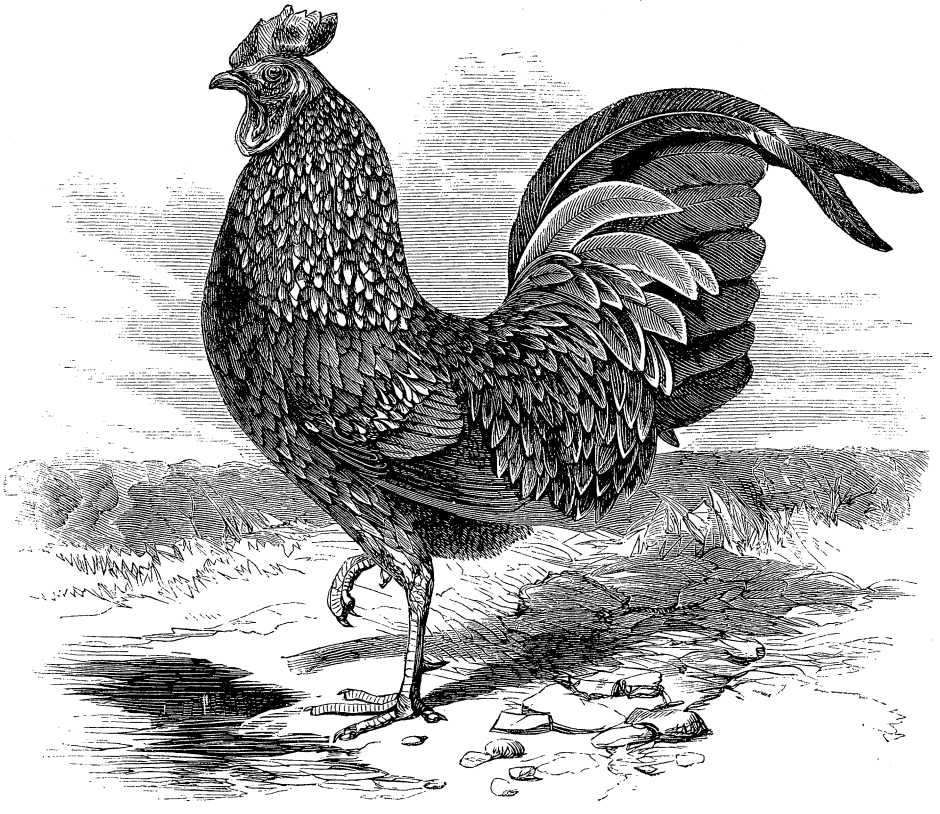


HASTINGS' TRAGOPAN, OR HORNED PHEASANT.



THE IMPEYAN PHEASANT.

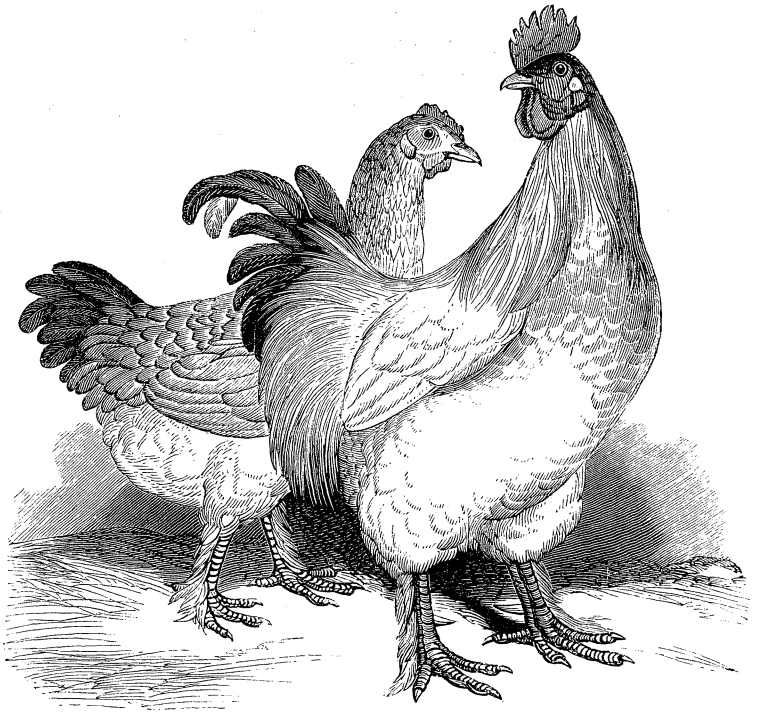
earliest historical records—the curious paintings of the Egyptians—show that this and most of our ordinary domestic animals were as completely domesticated at that early period as in our own day.



THE KULM COCK.

The original stock of the Domestic Fowl has been sought among the various species of *Wild*

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COCHIN CHINA FOWL.

Jungle Fowls in India, Java, Sumatra, &c. The KULM COCK, *G. giganteus*, also called the *Gigantic Cock*, is twenty-six inches high; it is found domesticated in the Deccan, and is supposed to have been brought from Java or Sumatra. The BANKIVA COCK, *G. Bankiva*, is smaller, and has the form of the Bantam; it is found frequenting the borders of forests in Java. The JUNGLE COCK of English sportsmen in India, *G. Sonneratii*, is abundant in the woods of the Western Ghaut Mountains and some other parts of India; there are several varieties or species. This is a remarkably fine and spirited race. Other wild species are the FORK-TAILED FOWL of Java, *G. furcatus;* and the BRONZED COCK, from the interior of Sumatra, *G. æneus*. Which of these remarkable birds may claim to be the original father of the *Domestic Fowl* of the civilized world, it is impossible to determine. It is suggested, by good authority, that, probably, the Bankiva Cock is the original stock, but that this has been modified by multiplied mixtures with other species through a period of many thousand years. One thing is certain—the domestic fowl, like the domestic pigeon, has within it a principle of variation, which has resulted in an almost indefinite number of permanent varieties, which reproduce and propagate themselves.

"The courage of the Domestic Cock is proverbial, and has become emblematic; his gallantry is admirable, his sense of discipline and subordination most exemplary. See how a good game-cock of two or three years' experience will, in five minutes, restore order in an uproarious poultry-yard. He does not use hard means of coercion when mild will suit the purpose. A look, a gesture, a deep chuckling growl, gives the hint that turbulence is no longer to be permitted; and if these are not effectual, severer punishment is fearlessly administered. Nor is he aggressive to birds of other species. He allows the turkey to strut before his numerous dames, and the guinea-fowl to court his single mate uninterrupted; but if the one presumes upon his superior weight, and the other on his cowardly tiltings from behind, he soon makes them smart for their rash presumption. His politeness to females is as marked as were Lord Chesterfield's attentions to old ladies, and much more unaffected. Nor does he merely act the agreeable dangler; when occasion requires, he is also their brave defender, if he is good for any thing."

The good qualities of the hen are even more conspicuous; her diligence in laying her eggs, her

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admirable patience in hatching them, her industrious care and assiduous labor in feeding her chickens, and her courage and energy in defending them, have always excited admiration.

Of the Domestic Fowl there are numerous varieties, each of which possesses some remarkable characteristics. The importance of poultry as a source of national wealth* has attracted great attention of late years, and consequently the various breeds of fowls have been the theme of careful investigation. The following are the most noted varieties:

The pure SHANGHAI FOWL: this is an enormously large bird. The cock stands twenty-eight inches high; weighs from ten to twelve pounds; is hardy, productive, and of a docile temper, and its flesh is tender and juicy. There are many varieties and several inferior kinds.

The COCHIN CHINA FOWL resembles the preceding, but is somewhat smaller; its qualities are similar.

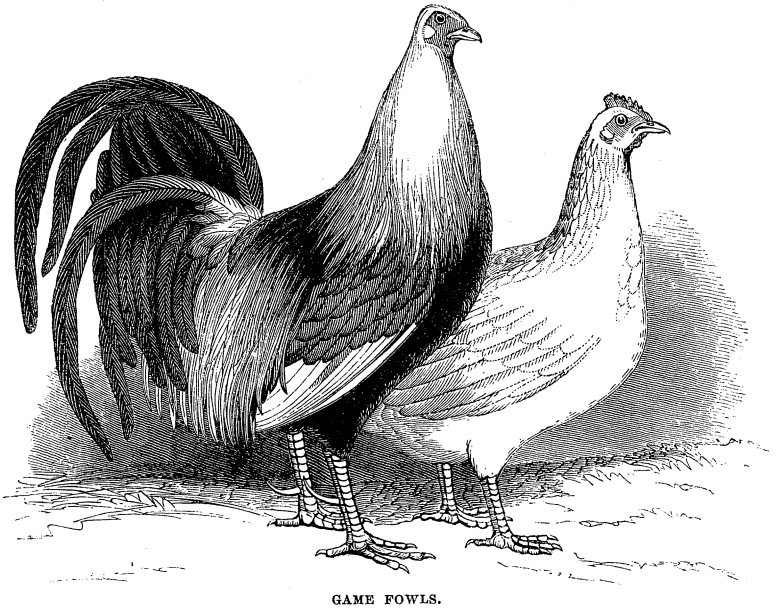
The MALAY FOWL stands twenty-six inches high, and weighs from ten to twelve pounds. The eggs are large and oval, and two of them are equal to three from the common breed. The cock is noted for his courage. The flesh does not take the first rank.

The PHEASANT MALAY FOWL, a variety of the preceding, is a useful and ornamental kind.

The GUELDERLAND FOWL, brought from North Holland, is jet black; they are good layers; their flesh excellent; they are inferior to none for beauty or utility.

The DORKING FOWL, which has been called the *Capon Fowl* of England, is of various colors. The white breed is the most noted; they are hardy, prolific, easily raised, and the flesh is excellent. The colored Dorkings are supposed to be mixtures with other breeds.

The SPANISH FOWL is black, and the hens are noted for continuous laying, without a disposition to sit. With many it is a favorite breed.



GAME FOWLS.

The GAME FOWLS are instinctive fighters, even the chickens, before they are fully fledged, being often stone blind from wounds received in their contests. Their chief use, in former times, has been as combatants in the cock-pit. This amusement is of some antiquity, and was formerly

* The following memoranda will be sufficient to establish the value of domestic poultry, in the light of political economy:

ANNUAL CONSUMPTION OF EGGS.

In France (produced)	8,000,000,000	In the United States, estimated	6,000,000,000
In Paris (consumed)	160,000,000	Annually imported into England from France,	60,000,000
In London, estimated	350,000,000	" " " Ireland,	75,000,000
In New York, estimated	150,000,000		

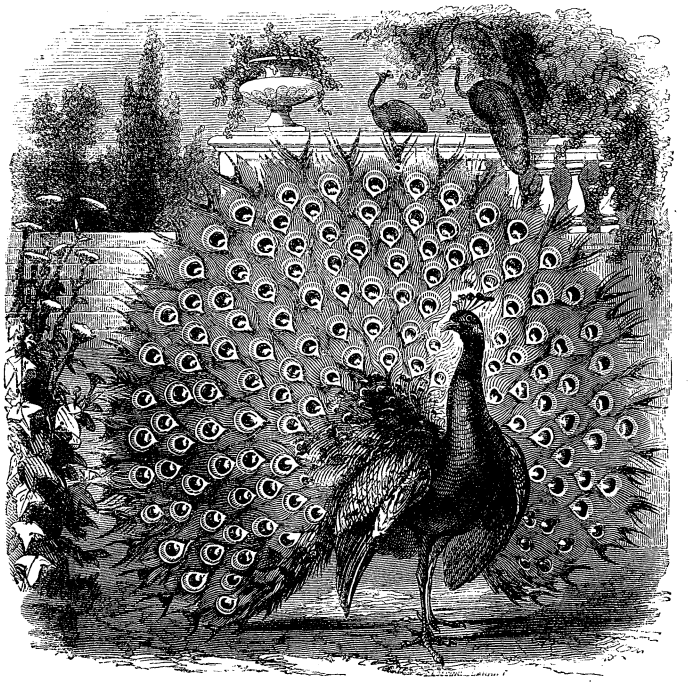
Value of Poultry of the United States, estimated, $40,000,000; of France, $70,000,000; of Great Britain, $55,000,000.

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pursued with great eagerness by all classes, the highest as well as the lowest.* It is now chiefly given up in this country† and in England, to gamblers of the most degraded class. In Mexico and South America, however, it is still practiced, and we are told that even the priest does not disdain, after the ministrations of the pulpit, and on the Sabbath, to bring his fighting-cock to the pit, and take his chance in the game.

The POLISH FOWL is said to be quite unknown in Poland, taking its name from some fancied resemblance between its tufted crest and the feathered caps of the Polish soldiers. The general color is black; the distinguishing feature is a full, parasol-shaped crest. The hens are good layers, but bad sitters. They are rather ornamental than useful.

Other varieties are the *Bolton Gray*, the *Hamburgh*, the *Chittagong*, the *Rumpless* or *Rumpkin*, the *Silky*, the *Negro*, the *Frizzled* or *Friesland*, the *Cuckoo*, the *Blue-Dun*, the *Lark-crested*, the *Bantams* of several kinds, &c. Indeed, the subject of Poultry is almost a science, and there are numerous books devoted to its practical and scientific elucidation.



PEACOCK.

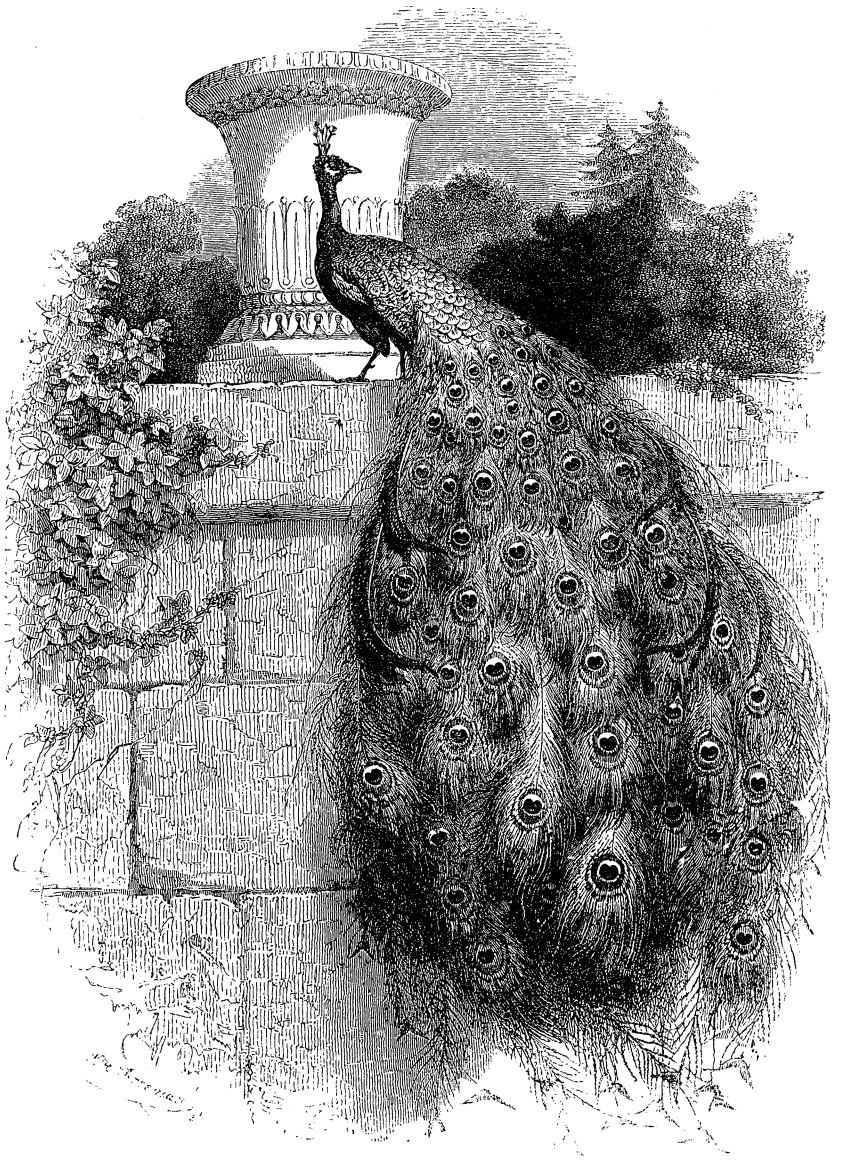
THE PAVONINÆ OR PEA-FOWL.

Genus PAVO: *Pavo.*—To this belongs the most splendid of birds, the PEACOCK, *P. cristatus:* the male of this species is noted for its long, lustrous tail, which it occasionally spreads, glittering

* From a work on cock-fighting we extract the following, referring to a period of some two centuries ago: "Cocking was kept up with great spirit at Newcastle, England. At one of their last meetings, the cockers at the above place, in point of extent, exceeded every thing of the kind known in Great Britain. Upward of two hundred cocks were fought, and the fighting generally good, particularly the cocks of Baglin Hill and Lockey, which all won great majorities. A remarkable circumstance occurred on the Saturday before fighting. A match was made for twenty sovereigns between Parker and Reed, feeders, and won by the latter, after a hard contest. Parker's cock, however, came round so soon after, that his party made a second match, to come off on the following Monday, for a like sum, which was again won by Reed, after a severe battle—a circumstance, perhaps, unknown in the annals of cocking. It is also calculated that, at the termination of the races, which finished with cocking, upward of one thousand cocks met their deaths. Newcastle, therefore, challenged the world for cocking. Cheltenham, Chester, Gloucester, Norwich, Lancaster, Preston, Stamford, &c., &c., were celebrated for their cocks. The patrons were the Earl of Derby, Sir William Wynne, Ralph Benson, Esq., &c., &c."

† Since this was written, we have met with the following in the newspapers, referring to San Antonio, in Texas:

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THE PEACOCK.

with hundreds of jewel-like eye-spots, producing an unrivaled effect of grace and beauty. The form of the bird is also exceedingly elegant, and the general plumage of the body exhibits rich metallic tints, that of the neck particularly being of a fine deep blue, tinged with golden-green. The female, however, is of a much more sober hue, her whole plumage being usually of a brownish color. The voice of the peacock is by no means suitable to the beauty of its external appear-

"Mexican amusements, in the shape of cock-fights and fandangoes, help to elevate and refine the people of San Antonio—such as choose to participate. Every Sunday, just after mass at the old Mission Church, there is a cock-fight, generally numerously attended. The pit is located in the rear of the church, about one square distant. On last Sabbath, going past the church door about the time of service, I observed a couple of Mexicans kneeling near the door in a pious attitude, which would doubtless have appeared very sober and Christianlike, had not each one held a smart game-cock beneath his arm! Pious souls! They had evidently paused a moment on their way to the cock-pit, in order to brush over their little short-comings for the past week."

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ance, consisting of a harsh, disagreeable cry, not unlike the word *paon*, which is the French name for the bird.

Although naturalized as a domestic bird in Europe and America, the peacock is a native of India, where it is still found abundantly in a wild state; and the wild specimens are said to be more brilliant than those bred in captivity. The date of its introduction into England is not known, but the first peacocks appear to have been brought into Europe by Alexander the Great, although these birds were among the articles imported into Judea by the fleets of Solomon. They reached Rome toward the end of the Republic, and their costliness soon caused them to be regarded as one of the greatest luxuries of the table, although the moderns find them dry and leathery. This, perhaps, as much as the desire of ostentation, may have induced the extravagance of Vitellius and Heliogabalus, who introduced dishes composed only of the brains and tongues of peacocks at their feasts. In Europe, during the middle ages, the peacock was still a favorite article in the bill of fare of grand entertainments, at which it was served with the greatest pomp and magnificence; and during the period of chivalry, it was usual for knights to make vows of enterprise on these occasions, "before the peacock and the ladies." In the present day, however, the bird is kept entirely on account of the beauty of its appearance.

In a state of nature peacocks frequent jungles and wooded localities, feeding upon grain, fruits, and insects. They are polygamous, and the females make their nests upon the ground among bushes; the nest is composed of grass, and the number of eggs laid is said to be five or six. They roost in high trees, and even in captivity their inclination to get into an elevated position often manifests itself; and they may frequently be seen perched upon high walls, or upon the ridges of buildings.

The JAPAN PEACOCK, *P. Japonensis*, improperly called the JAVANESE PEACOCK, *P. Javanicus*, resembles the preceding, but has a much taller crest: found only in Japan.

Genus POLYPLECTRON: *Polyplectron.*—To this belongs the THIBETIAN PEACOCK, *P. Thibetanus*, a very beautiful species, the head ornamented with a crest, and a long tail, not erectile, but capable of very wide expansion: found in Northern Thibet.



THE MOUND-BIRD OR BRUSH-TURKEY.

THE MEGAPODIDÆ OR MOUND-BIRDS.

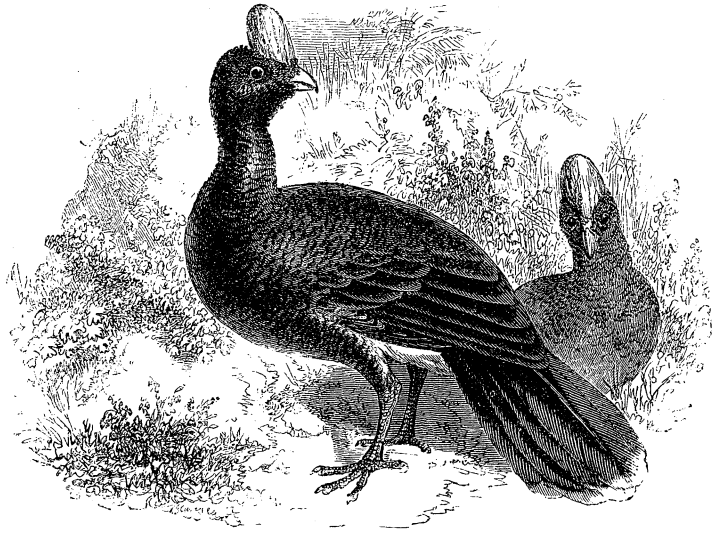
These consist of several species, some in India and some in Australia, and having very peculiar habits in relation to their nests and incubation.

Genus MEGAPODIUS: *Megapodius.*—To this belong several species, inhabiting the shady

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forests of India, and laying their eggs in holes in the sand, which they cover over, and leave them to be hatched by the sun. An Australian species, the JUNGLE-FOWL, *M. tumulus*, collects together a vast heap of vegetable matter, in which it deposits its eggs; it then covers them over with sand, and the heat of the sun creates a sufficient fermentation to hatch them. Some of these mounds are fifteen feet high and sixty in circumference! Another species, called the *Native Pheasant* by the Australians, the *Leipoa ocellata*, deposits its eggs in a mound, like the preceding, three feet high and nine feet in diameter.

The BRUSH-TURKEY of Australia, *Talegalla Lathami*, of the size of a turkey, lives in small flocks in the bush; several pairs of birds unite to build the mound, which consists of grass and leaves; these they grasp and bring together with their feet, scraping and clearing the ground as with rakes. A single mound will contain from two to four cart-loads of these materials. In this mass several females make their nests, about a foot from each other.



THE GALEATED CURASSOW.

THE CRACIDÆ OR CURASSOWS.

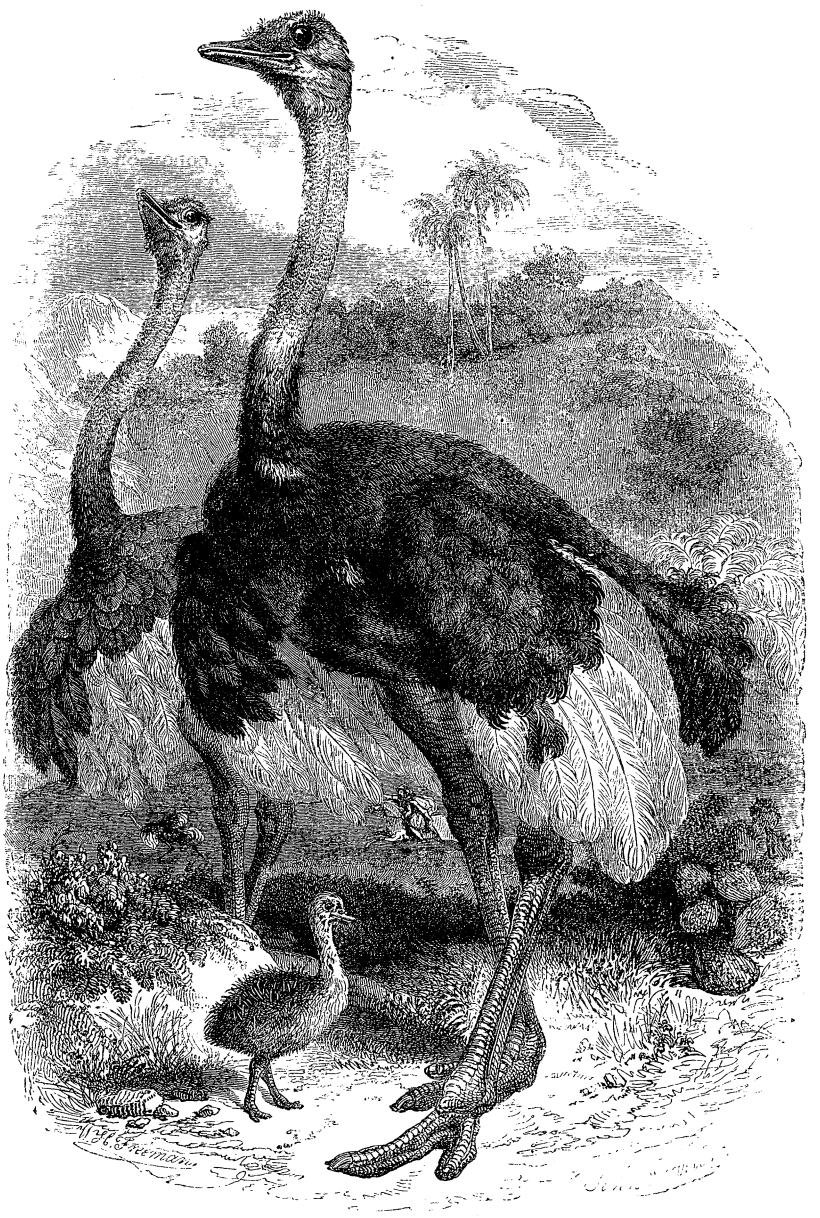
Of this group there are several species, all bearing some resemblance to the turkeys.

Genus CRAX: *Crax.*—This includes the COMMON CURASSOW, *C. alector*, three feet long, and nearly as large as a turkey; it is of a shiny black color, collects in small companies, and feeds on seeds and fruits. They are found in Brazil and Mexico, where they have been domesticated. Another and smaller species, the RED-KNOBBED CURASSOW, *C. Yarrellii*, is found in Peru, where it is called *Peury*.

Genus OURAX: *Ourax.*—This includes the GALEATED CURASSOW or HOCCO of Mexico, *O. Pauxi*, black above, with green reflections; has a pear-shaped knob of a stony hardness on the crown, of a lead color and two inches high, being nearly as large as its head; lives in the forests, and roosts on trees; mingles readily with other gallinaceous fowls. There are still other species of curassow in Northern South America.

Genus PENELOPE: *Penelope.*—This includes the GUAN, *P. cristata*, thirty inches long, and resembling the curassows; common in Brazil and vicinity. It is here called YACOU, from its note, which is very loud, and often rings through the forests, especially when several unite in the clamorous cry. This species is domesticated in Brazil, and also in Holland. The TEXAN GUAN, *Ortalida polyocephala*—*Ortalida McCalli* of Baird—figured and described by Cassin, is the only one of the *Cracidæ* found within the boundaries of the United States; it is twenty-four inches long, the tail seven inches; dark greenish-ash above; beneath dull yellowish-green; native of Texas, New Mexico, and Mexico. In the latter country it is called *Chiac-chia-lacca*. Another species of Guan is the *Ortalida Motmot*, called *Pheasant of Guiana;* it lives in small families, and has a loud note, which sounds like *Parrakoua*.

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OSTRICHES.

ORDER 6. **CURSORES.**

Of the *Cursores* or *Runners*, which have been included by many authors among the Grallatores, the *Common Ostrich* is a prominent example. They are nearly all large birds, with strong and generally elongated legs; the wings, on the contrary, are always reduced to a rudimentary condition, although the bones in number and form agree with those of the wings of other birds. In consequence of this small size of the wings, these birds are quite incapable of flight, and the only use they ever appear to make of them is to spread them out as if to catch the air, and thus aid them in running. In accordance with this deficiency of the power of flight, the bones are almost entirely destitute of the air-cells which in the ordinary birds give so much lightness to the

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skeleton; and the sternum is reduced to a simple convex shield, without any trace of the keel, which in other birds gives attachment to the powerful pectoral muscles. To compensate for this deficiency, however, the great size and muscularity of the legs render the pace of these birds in running exceedingly swift. These curious adaptations afford striking illustrations of the devising Wisdom and Sagacity, as well as the care and attention, which presided over the Creation of animals—looking into every detail of structure, and providing for each condition and every want and necessity, of every species—the smallest as well as the greatest. The pelvis in these birds is of large size, and the two sides of the arch unite at the pubis, which is not the case in any other species. The anterior toes are strong, either two or three in number, and terminated by strong nails. The hinder toe is entirely wanting, except in the genus *Apteryx*, in which this organ is present in a rudimentary condition. The plumage is of a very peculiar character, the barbs of the feathers being always separate, and often exhibiting a close resemblance to hairs. The bill is usually rather short, depressed, and somewhat triangular; but in the *Apteryx* it is elongated and cylindrical, with the nostrils placed at the tip. The head and neck are usually naked, or covered only with a short, downy plumage; the head is sometimes furnished with a horny crest, and the neck with fleshy wattles.

THE STRUTHIONIDÆ.

This family includes the Ostriches, the largest of known birds: in these the bill is broad, depressed, and triangular, with the apex obtuse, and the nostrils placed in a groove; the hinder toe is entirely deficient. The legs are very long, especially the tarsi, which are covered with scales. The plumage varies considerably in its texture in the different species, all of which frequent the desert plains of the countries inhabited by them.

Genus STRUTHIO: *Struthio.*—Of this there is a single species, the OSTRICH—*Thar Edsjanmel*, or *Camel-Bird*, of the Orientals, so called from its obvious resemblance to the camel; the *Struzzolo* of the Italians, *Strauss* of the Germans, and *Autruche* of the French—*S. camelus*, the largest of all existing birds. It inhabits the sandy deserts of tropical Africa, and has been celebrated since the most remote antiquity.* It measures from six to eight feet in height; its feet consist only of two toes; its head and neck are nearly naked; the general plumage is very lax, and the quill-feathers of the wings and tail are particularly remarkable for the length of their barbs, which, although furnished with barbules, are completely separate from each other; these are the well-known ostrich-feathers, which, from their elegance, are so highly prized as ornaments.

The ostriches live together in small flocks, feeding upon grass, grain, the tops of plants, &c.; like the gallinaceous birds, which they resemble in their food, they have an enormous crop and a strong gizzard. In confinement, however, they appear to devour indiscriminately almost any thing that comes in their way, as they have been frequently known to pick up and swallow pieces of leather, wood, stones, and even metal. Valisnieri found in the stomach of one of these birds a farrago of grass, nuts, cords, stones, glass, brass, iron, tin, copper, lead, and wood, and among the stones one weighing over a pound. An ostrich in the London Zoological Gardens was deformed and afterward died from swallowing part of a parasol. These hard substances are probably taken to assist the action of the gizzard.

The African ostrich is polygamous, the male usually associating with from two to six females. The hens lay all their eggs together—each ten to twelve—in one nest, this being merely a shallow cavity scraped in the ground, of such dimensions as to be conveniently covered by one of these gigantic birds in incubation. An ingenious device is employed to save space, and give at the same time to all the eggs their due share of warmth. Each one of the eggs is made to stand with the narrow end on the bottom of the nest and the broad end upward, and the earth which has been scraped out to form the cavity is employed to confine the outer circle, and keep the whole in the proper position. The hens relieve each other in the task of incubation during the

* The ostrich is generally understood to be the bird designated by the terms *Joneh* or *Jaanah* and *Rinonim* in the Scriptures—Levit. xi. 19; Deut. xiv. 15; Job xxx. 29; Isaiah xiii. 21; xxxiv. 13; xliii. 20; Jer. l. 39; Lament. iv. 3; Mic. i. 8; Job xxxix. 13. In many of these passages, Jer. l. 39, and Isaiah, for instance, our version reads "*Owls*," and in Leviticus does not mention the ostrich, but the general opinion seems to be in favor of the ostrich being intended.

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day, and the male takes his turn at night, when his superior strength is required to protect the eggs or the newly-fledged young from the jackalls, tiger-cats, and other enemies. Some of these animals, it is said, are not unfrequently found lying dead near the nest, destroyed by a stroke from the foot of this powerful bird. The eggs weigh about three pounds, and are regarded as a great delicacy. The cry of the ostrich, at a distance, sounds like the voice of a lion, and is frequently mistaken for it. When pursued it runs with such rapidity as speedily to outstrip the swiftest horse, and the hunters, therefore, either relieve one another in the chase, or bewilder the bird by approaching it in several directions; but the pursuit is not always unattended with danger, as the ostrich sometimes attacks its enemies, striking out with its feet with great force. It will carry a man on its back without much diminution of speed. In captivity it often becomes tame and gentle with those to whom it is accustomed, but generally exhibits more or less enmity toward strangers, whom it will endeavor to knock down and trample underfoot.

Genus RHEA: *Rhea.*—This includes the AMERICAN OSTRICH, *R. Americana*, called also *Nandou* or *Rhea:* it is scarcely more than half the size of the African species, from which it also differs in having the head covered with feathers, and the feet furnished with three toes. It is of a nearly uniform gray tint, and the feathers of the wings and tail, although elongated, possess none of the beauty of those of the true ostrich; they are only employed in the manufacture of light dusting-brooms. It is very abundant in the great plains of tropical America, where it is pursued on horseback, and captured either by the lasso, or by throwing at its legs an instrument formed of two heavy balls or stones, attached together by a leathern thong. Mr. Darwin, who had frequent opportunities of observing these birds, says that they take the water readily, and swim across broad and rapid rivers, and even from island to island in bays.



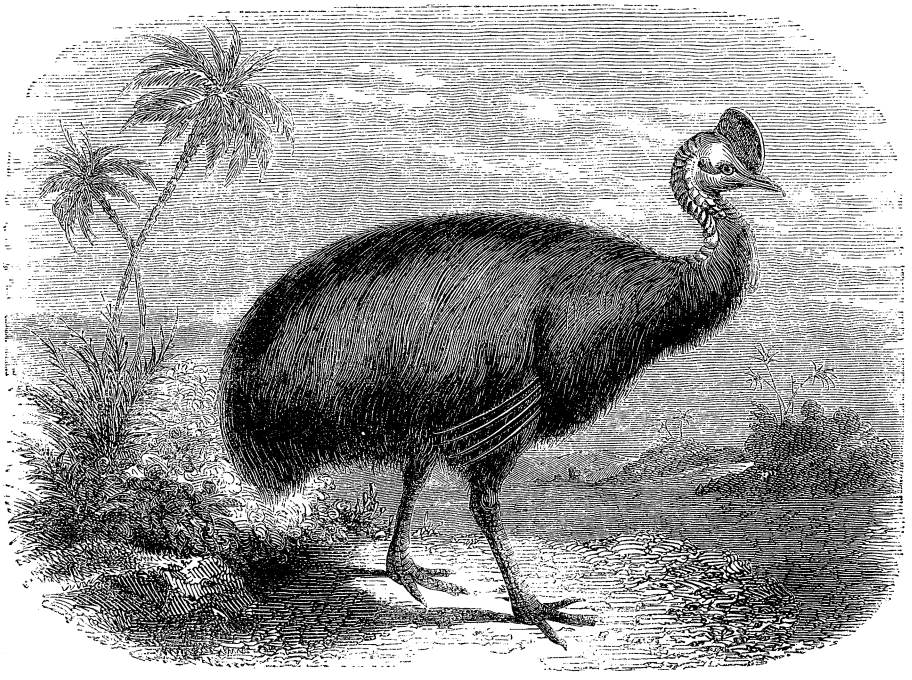
THE PATAGONIAN RHEA.

They are said to be polygamous; the male bird prepares the nest, collects the eggs, which are frequently laid by the females at random on the ground, and performs all the duties of incubation. Mr. Darwin confirms these observations, and says that four or five females have been seen to lay in the same nest, and that the male when sitting lies so close that he himself nearly rode over one. At this time the males are said sometimes to be very fierce, and they have been known to attack a man on horseback, trying to kick and leap on him. Another species, the PATAGONIAN RHEA or PETISE, *R. Darwinii*, is found in Southern Patagonia; it is of a dark, mottled color, and about half the size of the Rhea.

Genus DROMAIUS: *Dromaius.*—This includes the *Emeu* of New Holland, *D. Novæ Hollandiæ*, which is nearly as large as the African Ostrich, measuring from five to seven feet in height. It has three toes on each foot, and these are furnished with nearly equal claws; the head is covered with feathers, but the throat is naked, and the plumage of the body closely resembles long hairs, hanging down on each side of the body from a central line, or *parting*. The neck is covered with feathers. The birds are abundant in the southern parts of Australia; but in the more populous parts of the British colonies there, they are now extinct. They are much sought for, both by na-

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tives and Europeans, for the sake of their flesh, that of the young birds being described as very delicate, while that of the old ones is compared to beef. Their eggs also are eaten; and it is said that during their breeding season, the natives of some parts of Australia live almost entirely upon Emeu's eggs. The old birds are hunted by trained dogs, which have been taught to avoid the powerful kicks of their quarry, by running up alongside of the bird and then springing suddenly upon its neck. They are monogamous, and the males, as in the case of the Rhea, perform the duties of incubation. The eggs are nearly as large as that of the Ostrich, but of a dark color; and the young, when first hatched, are rather elegantly striped with black and whitish-gray.



THE CASSOWARY.

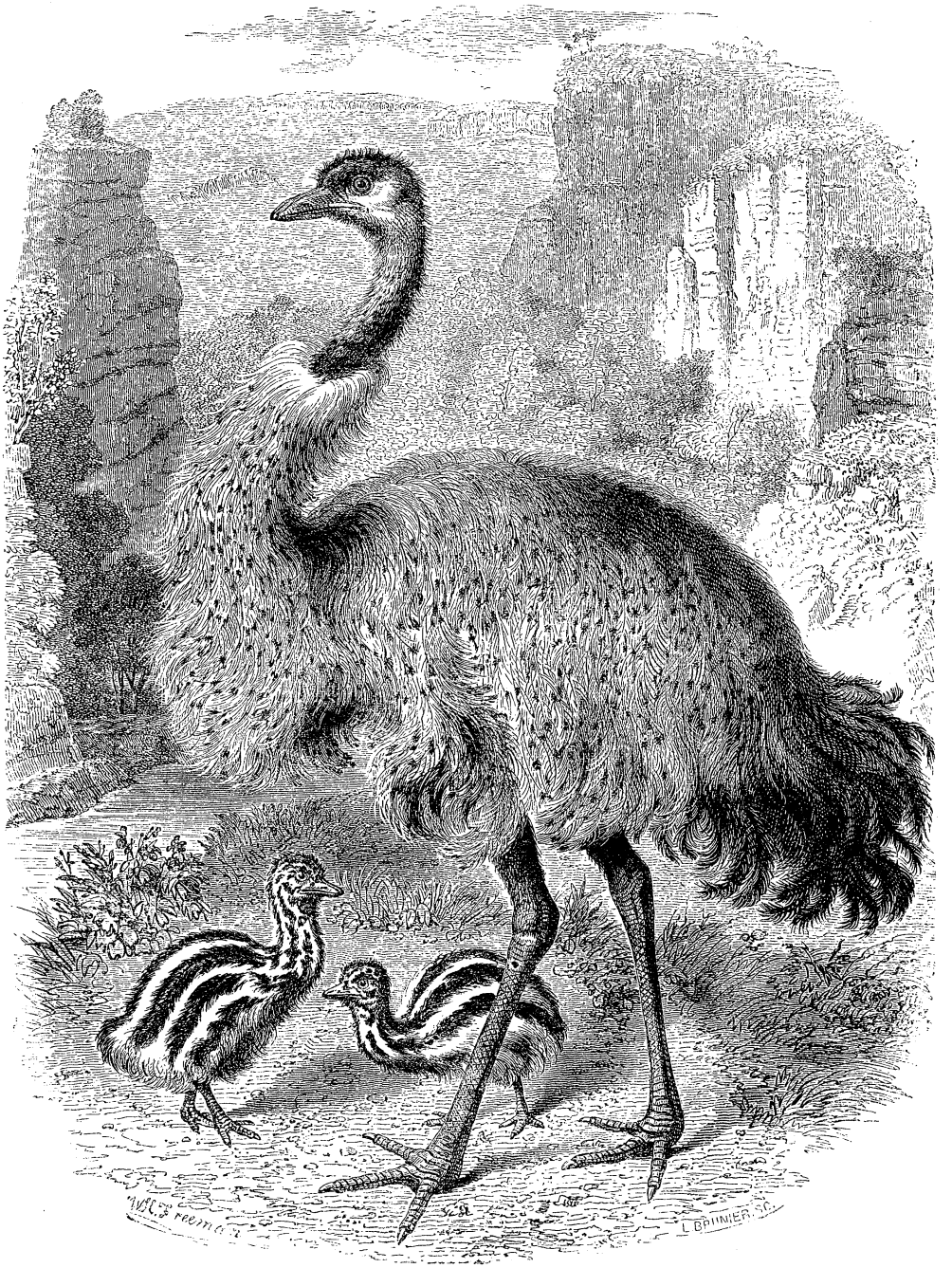
Genus CASUARIUS: *Casuarius.*—To this belongs the Cassowary, *C. galeatus*, an inhabitant of the islands of the Eastern Archipelago. It stands about five feet in height, and is distinguished from the other members of the family by the possession of a peculiar horny crest or helmet upon the head, by the wings being furnished, instead of feathers, with about five cylindrical stalks destitute of barbs, and by the large size of the claw on the inner toe. The head and neck are naked and wattled, and these parts are of a bright red color, variegated with blue. The body, which is very stout, is covered with long pendent feathers, which resemble hair even more closely than those of the Emeu. It feeds upon fruits, herbage, and seeds, and, like the Ostrich, swallows hard substances, probably to assist the action of the gizzard. The eggs are of a greenish tint.

The Mooruk, *C. Bennetti*, is a very curious bird, recently discovered in New Caledonia, and a specimen of which is in the London Zoological Gardens. Its habits are similar to those of the cassowary; it has, however, no horny crest; its cry is *Mooruk*, whence its name. Its history is yet very imperfect.

APTERYGIDÆ.

Genus APTERYX: *Apteryx.*—This includes two species of birds, inhabitants of New Zealand: the *A. Australis* and *A. Oweni*. These are distinguished by the elongated slender form of the bill, which bears the nostrils at the tip of the upper mandible, by the comparative shortness of the legs, and the presence of a short hind toe, furnished with a strong claw. The wings are perfectly rudimentary, and concealed under the feathers, which resemble those of the Emeu.

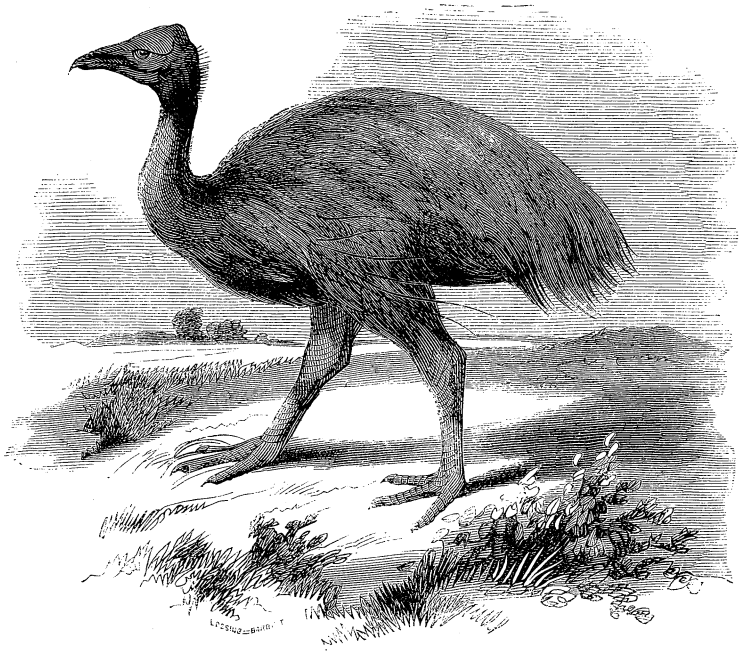
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THE EMEU.

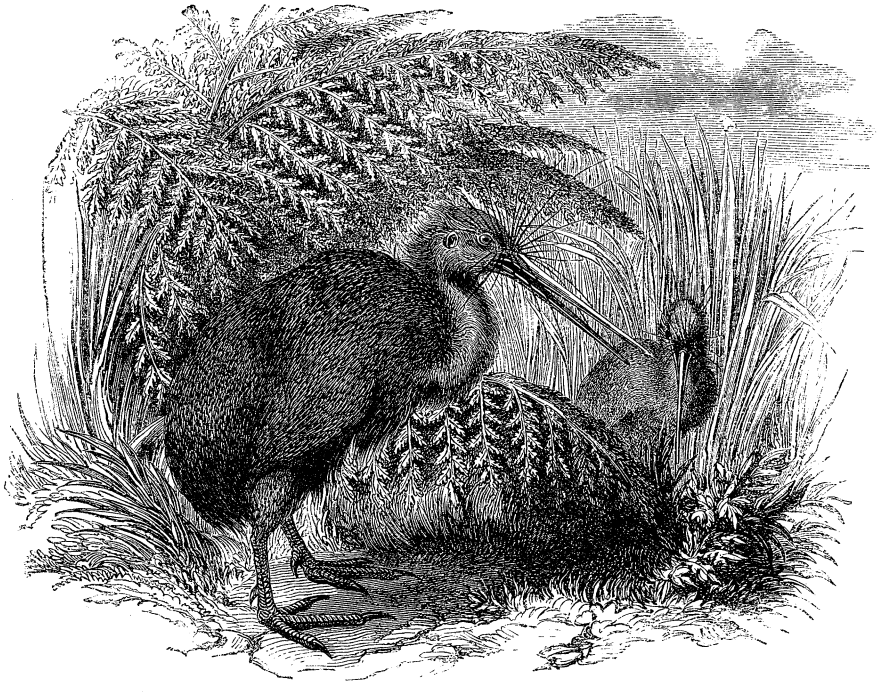
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THE MOORUK.

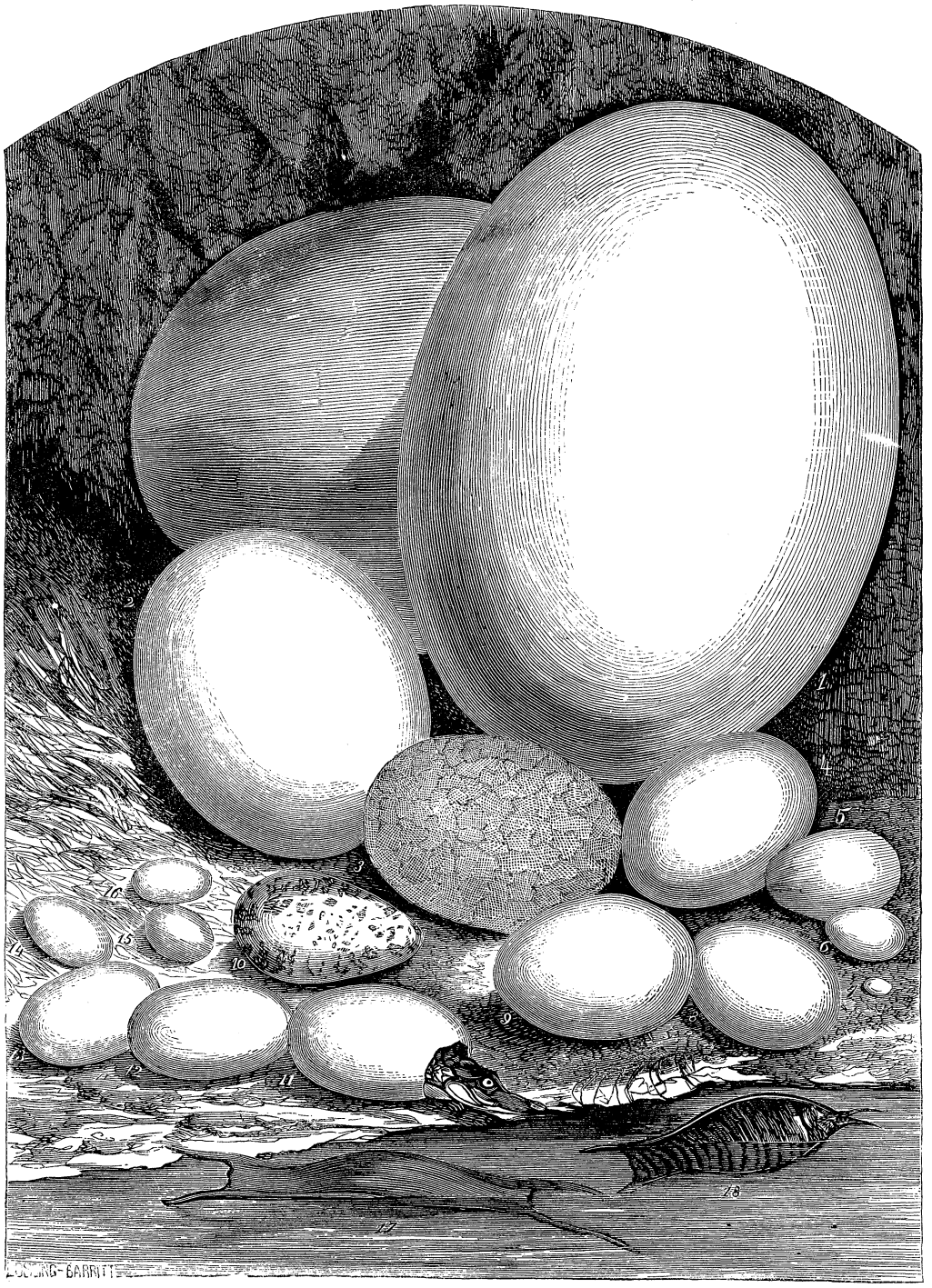
They are nocturnal in their habits, feeding upon insects, running with great rapidity, and defending themselves vigorously with their feet. The name of *Kiwi-Kiwi* is given to them by the



THE APTERYX.

natives of New Zealand, who use the skins, which are highly valued in making dresses. A living specimen has been in the Zoological Gardens of London.

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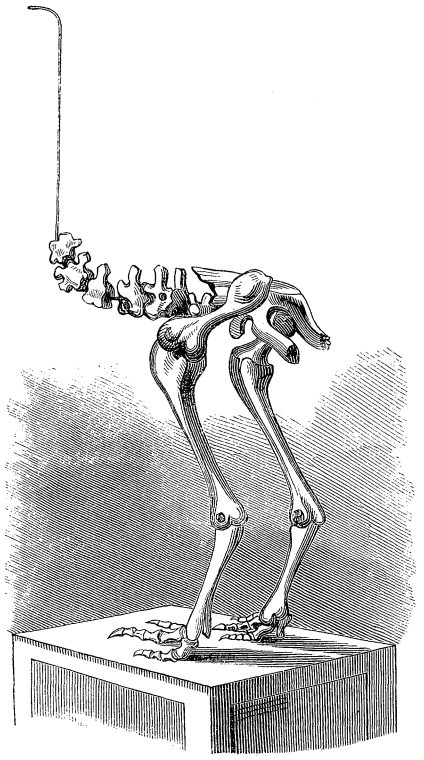


COMPARATIVE VIEW OF THE SIZE OF THE EGGS OF DIFFERENT ANIMALS.*

* 1, Epyornis; 2, Ostrich; 3, Cassowary; 4, Wild Goose; 5, Hen; 6, Pigeon; 7, Humming-bird; 8, Eagle; 9, Vulture; 10, Penguin; 11, Crocodile; 12, Python; 13, Fresh-water Tortoise; 14, Boa of St. Lucia; 15, Tortoise; 16, Ophidian; 17, Dog-fish; 18, Ray-fish. The figure in the back-ground without a number represents the egg of the Moa.

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Bones of Extinct Struthionidæ.—The eggs and some of the bones of a gigantic bird belonging to this family, the *Epyornis maximus*, have been recently discovered in the island of Madagascar and taken to Europe. The largest of the eggs, which were found imbedded in alluvial soil, measured no less than twelve inches and two-thirds in length, while the egg of the Common Ostrich is only about half that length. The difference in the contents of the two eggs is much greater, for M. Isidore Geoffroy Saint-Hilaire, who was the first describer of these extraordinary remains, calculates that the largest egg of the *Epyornis* received by the Paris Museum would contain ten and an eighth quarts, or about as much as six eggs of the ostrich, sixteen of the cassowary, or one hundred and forty-eight of the common hen. One of the eggs had been perforated by the natives, and used as a vessel for carrying water. From the dimensions of the bones, it is supposed that this bird must have been at least double the size of the ostrich; and it appears not improbable that it may still be in existence in the interior of the almost unknown island in which its remains were found.

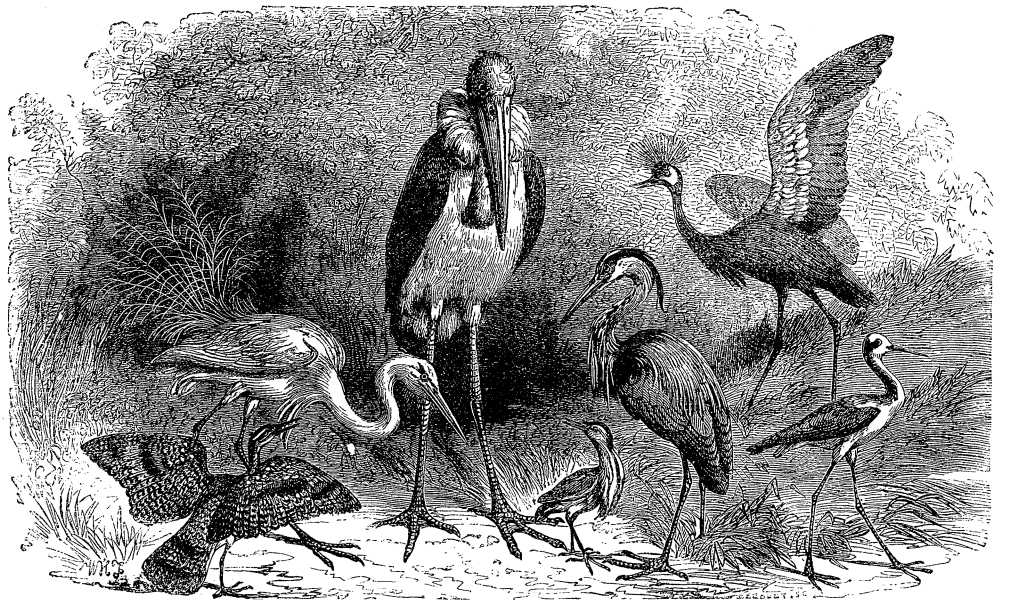


SKELETON OF THE DINORNIS GIGANTEUS—THE NECK SUPPLIED BY A WIRE.

Another group of gigantic extinct birds is also placed in the immediate neighborhood of the Struthionidæ by some authors, but distributed by others between these and the Grallatores. These are the *Dinornidæ*, the bones and even the eggs of which have been found in considerable quantities imbedded in the volcanic sands of New Zealand.

Several species have been distinguished, among which the *Dinornis giganteus* was pre-eminent in stature. A nearly complete skeleton is found in the Museum of the Royal College of Surgeons, London, from which it has been calculated that it must have been at least fourteen feet in height. It appears exceedingly probable that these birds, if they do not still exist in the more inaccessible parts of the islands of New Zealand, were inhabitants of that distant land when it was first peopled with human beings, as the traditions of the natives describe a gigantic bird, to which they give the name of *Moa*, with which their ancestors are said to have waged a war of destruction. The natives showed one traveler the place where the last Moa was destroyed after a tremendous battle, in which several of its assailants were killed. The egg of one of these birds was discovered by Mr. Walter Mantell, who describes it as so large that his hat would but just serve as an egg-cup for it; it would, therefore, appear to have been nearly as large as that of the *Epyornis*.

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ORDER 7. **GRALLATORES.**

In the *Grallatores* the feet are always formed for walking in the water; they are usually of great length, but the toes are never united by a membrane, in the same way as in the swimming birds. They are, however, sometimes surrounded by membraneous lobes, and in many cases furnished with a small web at the base. The great length of the legs is generally due to the elongation of the tarsi; but the tibiæ are also frequently very long, and generally bare of feathers for a greater or less extent. The naked portion of the tibiæ is covered with a reticulated skin, like that of the tarsi and toes; but in many cases the latter are more or less covered with horny plates or scutella. The toes are usually four in number—three in front and one behind; the latter varies greatly in its development, being sometimes very small, and sometimes even longer than the others; it is placed either on the same level with the anterior toes, or raised more or less upon the back of the tarsus. The anterior toes are usually elongated, and the two outer ones are often united together for a certain portion of their length.

The great length of the legs in the majority of these birds enables them to wade with facility in shallow water in search of the fish and other aquatic animals upon which they feed; hence the name of *Grallatores* or *Waders* applied to the order. In many cases, however, this does not apply; for the legs of several species are too short to be of any use to them in wading; while other species, in which the legs are much elongated, are inhabitants of dry situations, and are never found in the vicinity of water. Some species run upon the surface of floating aquatic plants, and others swim and dive with greater facility than many of the true Natatorial birds. They are all active birds, running with great swiftness, and usually possessing great power of flight.

The development of the neck keeps pace with that of the legs, and in most cases the beak also is of considerable length. The latter organ is almost always longer than the head, usually of an elongated conical form, sometimes almost cylindrical, and occasionally flattened and more or less dilated. The tongue is fleshy and usually triangular.

The wings are well developed, often of great size, and the birds are almost always powerful fliers, although many of them, when disturbed, appear to prefer trusting to their long legs to betaking themselves to the air. The plumage is soft, and bears a certain resemblance to that of the Natatorial birds, but the feathers are generally furnished with a distinct plumule.

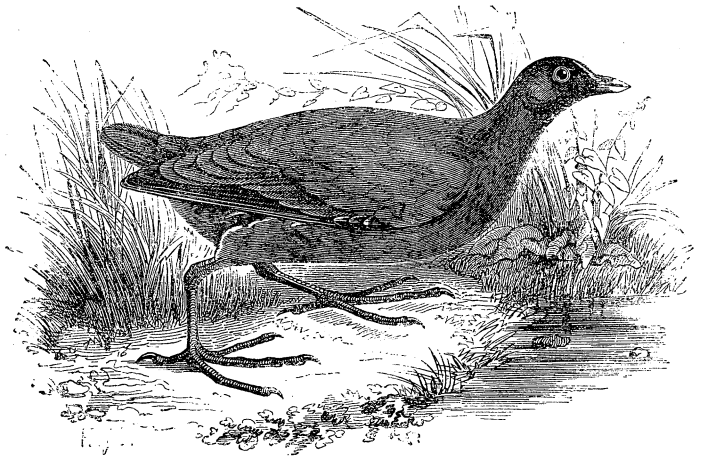
The habits of these birds vary considerably. Most of them inhabit the vicinity of water or marshy places, where they wade about in search of aquatic animals, or walk upon the moist

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ground or among the rank herbage, seeking for worms and insects. A few are found in dry situations, but their food is much of the same nature as that of their marsh-loving brethren, and very few appear to take any considerable portion of vegetable nourishment. Nearly all are valued for the table, and some are among the most delicious of viands. The following are included in this extensive and important order: the *Rails*, *Jacanas*, *Snipes*, *Phalaropes*, *Sandpipers*, *Curlews*, *Ruffs*, *Tatlers*, *Stilts*, *Avocets*, *Spoon-Bills*, *Ibises*, *Storks*, *Cranes*, *Herons*, *Bitterns*, *Boat-Bills*, *Plovers*, *Oyster-Catchers*, *Pratincoles*, *Thick-Knees*, *Bustards*, *Trumpeters*, &c.

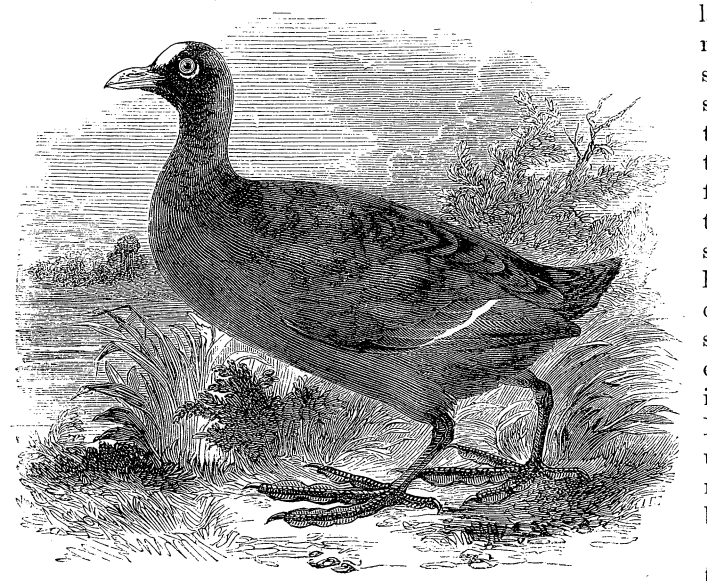
THE RALLIDÆ OR RAILS.

In these the bill is short; the legs stout; the wings of moderate size, and in some genera armed with spines at the carpal joint. They feed principally upon worms, mollusca, and insects; but many also eat a good deal of vegetable food, such as blades of grass and seeds. Some of them are solitary, others more or less gregarious in their habits. They build a large nest of dried grasses and sedges, placing it upon the ground among thick herbage; the eggs vary considerably in number, and the young are able to run, and frequently to swim, as soon as they are hatched.



THE MOOR-HEN.

Genus GALLINULA: *Gallinula*.—This embraces the European Moor-Hen or Water-Hen, *Poule d'eau* of the French, *G. chloropus*, thirteen inches long; upper parts olive-brown; beneath uniform slate-gray. It lives among the reeds and sedges along the banks of rivers and lakes, feeding on insects, worms, mollusca, and seeds. It is often seen on rivers, ponds, and lakes, swimming with a nodding motion of the head. When disturbed they will take a short flight, but prefer a retreat to the rushes and sedges. They sometimes perch on trees overhanging the water. This species is partially domesticated in some parts of England, and several broods have been hatched in the canal of St. James' Park, London. It is widely distributed over Europe, Asia, and Africa. It is sedentary in England.



THE COMMON EUROPEAN COOT.

There are several species in the United States. The Purple Gallinule, *G. Martinica*, is fourteen inches long; general color a rich violet-purple. It passes the summer in Florida, Georgia and Louisiana, retiring further south with its brood in autumn. It is a vigorous, active

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bird, concealing itself in the coarse herbage of the marshes, and taking wing with reluctance. While in the Southern States it frequents the rice-fields, rivulets, and fresh-water ponds, in company with the Florida species. It is occasionally seen in the Middle and Southern States.

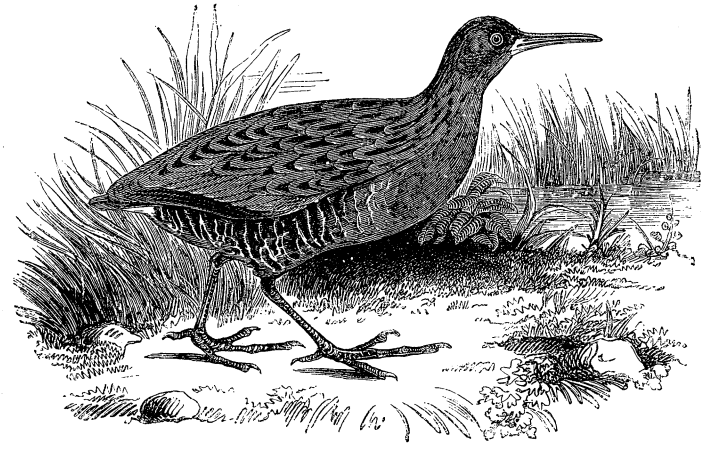
The Florida Gallinule, *G. galeata*, closely resembles the European species, already described, as well as the Javanese species, *G. ardosiaca*. It is fourteen inches long, and is common in the West Indies and Florida; accidental in the Middle and Northern States in summer.

Genus FULICA: *Fulica*.—This includes several species, called *Coots*, which resemble the gallinules, but they are more exclusively adapted to an aquatic life; they live in salt as well as fresh water, and are seldom seen on the land. They are nocturnal in their habits, the old birds being rarely seen by day; they walk awkwardly on the land, and take wing with difficulty; sometimes they dive into the mud rather than rise from the water.

The Common Coot of Europe, *F. atra*, is sixteen inches long; whole plumage sooty-black, tinged with slate-color, though white varieties are sometimes seen. It is widely distributed over Europe and Asia; stationary in England.

The Cinereous Coot, *F. Americana*, is similar to the preceding, and was formerly supposed to be the same species; it is found in all the temperate parts of North America, and breeds over an extent of fifty degrees of latitude. The nest is secreted among the rank herbage on the surface of the water, and contains about eight eggs. The food consists of insects and mollusca, with abundance of gravel. During the winter it migrates southward, but only so far as may be necessary to obtain food; during this season they accumulate in the inundated, marshy districts of Florida in immense numbers, where they are very noisy, chattering by night and day.

Genus RALLUS: *Rallus*.—To this belong the *True Rails*. The Common Water-Rail of Europe, *R. aquaticus*, is eleven and a half inches long, olive-brown above, dull gray below; it is found in marshy districts, and delights to dwell among the rank vegetation of shallow pools and water-courses. If surprised, it flies a short distance with its legs hanging down. It feeds on worms, snails, slugs, and vegetable matter. The nest is made of sedge and common grass, on the ground; the eggs are six to eight, and spotless white. It is common throughout the southern parts of Europe and some portions of Asia, where it is stationary; a few are seen in Northern Europe in summer.



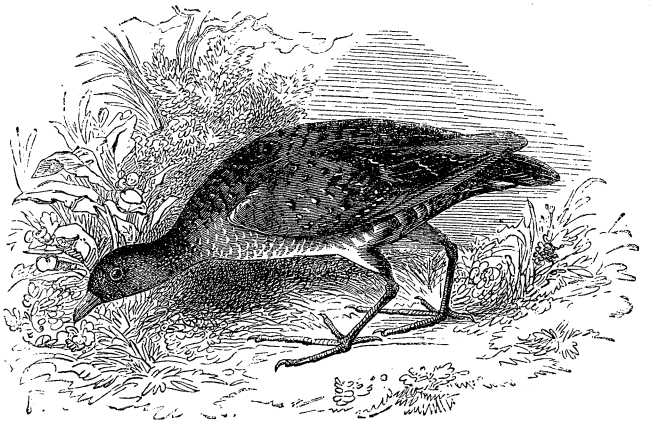
COMMON EUROPEAN WATER-RAIL.

There are several American species of this genus. The Virginia Rail or Mud-Hen, *R. Virginianus*, resembles the European water-rail; it is nine and a half inches long; black, sprinkled with brown, above; rufous beneath; feeds on worms, aquatic insects, fish, small mollusca, and seeds; lives along fresh-water streams and in morasses, and is occasionally seen on the sea-coast. It is migratory, and has a sharp cry, frequently uttered at night during the breeding season. The nest, situated in the wettest part of a marsh and fixed upon a tussock of grass, contains six to ten eggs, of a dirty white. It is found in the entire temperate portion of North America.

The Clapper Rail or Salt-Water Marsh-Hen, *R. crepitans*, is fourteen inches long; above black, spotted with olive; beneath rufous; resembles the preceding, but is larger. In the course of its spring migrations northward, in the hours of twilight, it is often heard on its way uttering its loud, harsh cry. This becomes almost incessant after it has settled in its marshy tenement, and is particularly vehement before a storm.

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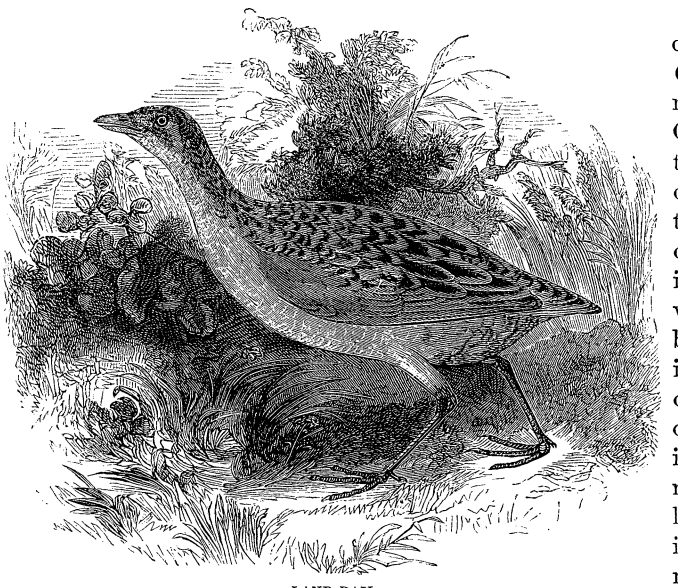
The Fresh-Water Marsh-Hen, *R. elegans*, is a large and beautiful species, nineteen inches long; upper parts streaked with brownish-black and light olive-brown; beneath bright orange and greenish-brown. It frequents fresh-water marshes and ponds in the interior, as well as along the coast, from Texas to New Jersey; very abundant in the South-western States. It feeds on seeds, insects, tadpoles, leeches, and small crawfish; the nest is made on the ground, being raised six or eight inches by a mass of withered leaves and grass; eggs eight to ten.



THE COMMON AMERICAN CAROLINA RAIL.

Genus PORZANA: *Porzana.*—This includes the Common Rail of the United States, known by the various names of *Carolina Rail*, *Soree Rail*, *English Rail*—*P. Carolina*—*Ortygometra Carolina* of De Kay and Audubon, *Rallus Carolinus* of Bonaparte; it is nine and a half inches long, brown-olive above, beneath varied with white, black, and ash. It breeds in the vast reedy swamps and lagoons throughout the temperate portions of the United States. Its flesh is greatly prized, and it is much sought for by the sportsmen of the Middle and Southern States, where it appears in large numbers in autumn, being particularly abundant along the shores of the Atlantic rivers, near their mouths.

Other species are the Little Black Rail, *P. Jamaicensis*, found in the Middle and Southern States along the Atlantic shores, and the Yellow Rail, *P. Noveboracensis*, found in Eastern North America.

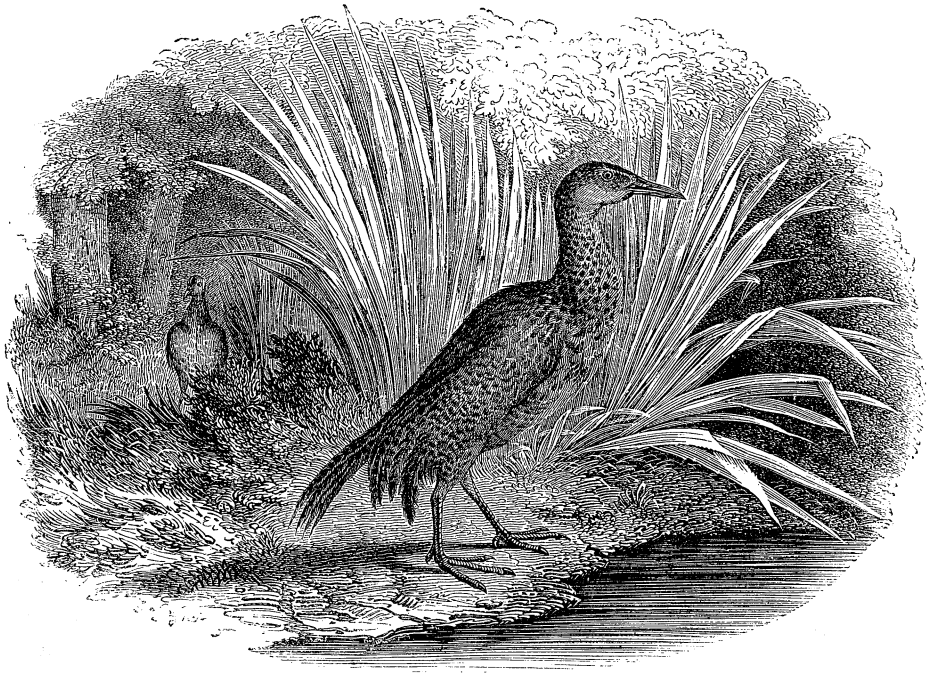


LAND-RAIL.

Genus CREX: *Crex.*—This includes several species of Rail, called *Crakes* in England. The prominent species is the Corn-Crake, Corn-Drake, or Land-Rail of the English, the *Roi des Cailles* of the French, *Re di Quaglie* of the Italians, and *Wachtel-König* of the Germans; *C. pratensis*. It is seven inches long, mottled above with dark brown, ash and reddish, breast olive, abdomen white. It is very shy, lives in grassy meadows, fields of young corn, and osier-beds; feeds on worms, snails, insects, larvæ, seeds, and grain; makes its nest on the ground, and lays from ten to twelve eggs. It is not easily flushed, but runs rapidly before a dog. The young are covered with a blackish down, and are almost immediately able to follow the mother upon being hatched. This species inhabits Europe generally; it is found in Greenland, and is accidental on the coasts of the United States.

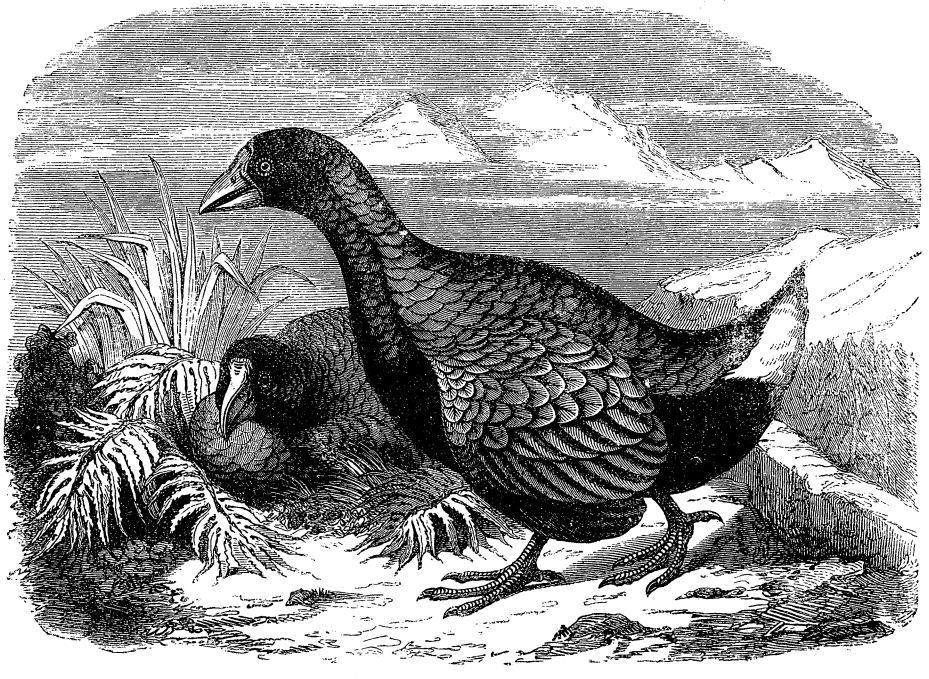
Other species are the Spotted Crake, *C. porzana*; Little Crake, *C. pusilla*; Baillon's Crake, *C. Baillonii*; all found in Europe, Asia, and Africa.

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THE OCYDROMUS AUSTRALIS

Genus OCYDROMUS: *Ocydromus.*—This includes the *O. Australis*—*Rallus trogodytes* of Gmelin—seventeen inches long; color brown; it flies badly, but runs with great swiftness; never takes to the water, scratches the earth like a hen, and feeds on worms and grubs. Found in New Zealand.



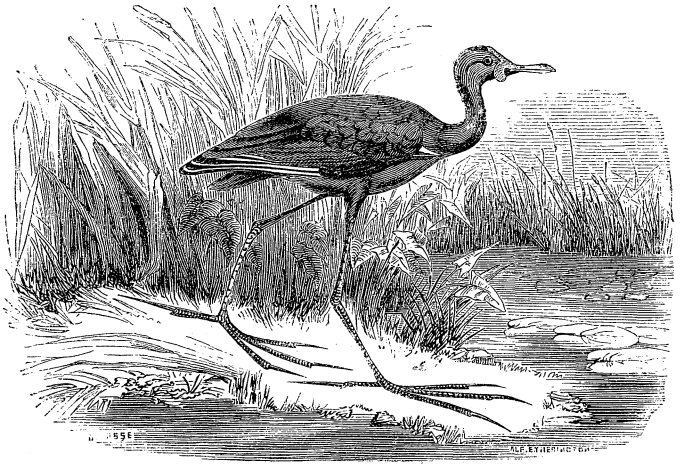
THE NOTORNIS MANTELLI.

Genus NOTORNIS: *Notornis.*—To this belongs the *Notornis Mantelli*, a species of peculiar

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interest; found in New Zealand, that strange land which is said to have but two indigenous quadrupeds—a rat and a badger—but which produces several very original and remarkable birds. We have already spoken of the *Diornis giganteus* of this island, nearly twice as large as the ostrich. The bones of this, as well as of some smaller species, had been found, but they were supposed to be extinct. In 1849, however, a party of seal-hunters, who were pursuing their avocations in Dusky Bay, having observed the trail of a bird in the snow with which the ground was then covered, determined to give chase. Proceeding in the direction of the footsteps, they at at last caught sight of the object of their pursuit. Their dogs gave chase, and finally, after a long hunt, the bird was captured alive, in the gully of a sound behind Resolution Island. It ran with great speed, uttered loud cries, and violently attacked the dogs. But, notwithstanding the long struggle, it was caught uninjured and taken on board ship, where, after having been kept alive for three days, it was at length killed and eaten, the sailors who partook of the meal describing the bird as most delicious food. Fortunately, these nautical epicures, who certainly were no great naturalists, did not pluck their bird, but skinned it, and Mr. Walter Mantell, son of the celebrated geologist, Dr. Mantell, being there, procured it, and thus we have a tolerably correct account of the bird. It was evidently a species of Rail, somewhat larger than a common fowl; the head, neck, breast, and flanks were of a brilliant purple; the back of a dark olive. It could not fly, but ran with great swiftness. This proved to be one of the smaller species above referred to, and received the name of *Notornis Mantelli*.

Probably the race is nearly extinct. Nay, Dr. Mantell believed this bird to be the last of its tribe. We are familiar with the fact that in remote eras, races have existed and have passed away; but to be in at the death, as it were, of a species, is somewhat startling, and naturally suggests curious, if not painful inquiries, as to the purpose of creations which are thus left to perish. So far as we know, creation has ceased upon this earth; there is no renewal of races that have died out, as there is no production of new ones that have never existed. We can see reasons for the disappearance of the iguanodon, the megatherium, the icthiosaurus and the mastodon, for they were gigantic and oppressive disproportions to the average of animal life; but why a gentle and beautiful and useful species like the notornis should be permitted to perish, is beyond the scope of human reason.

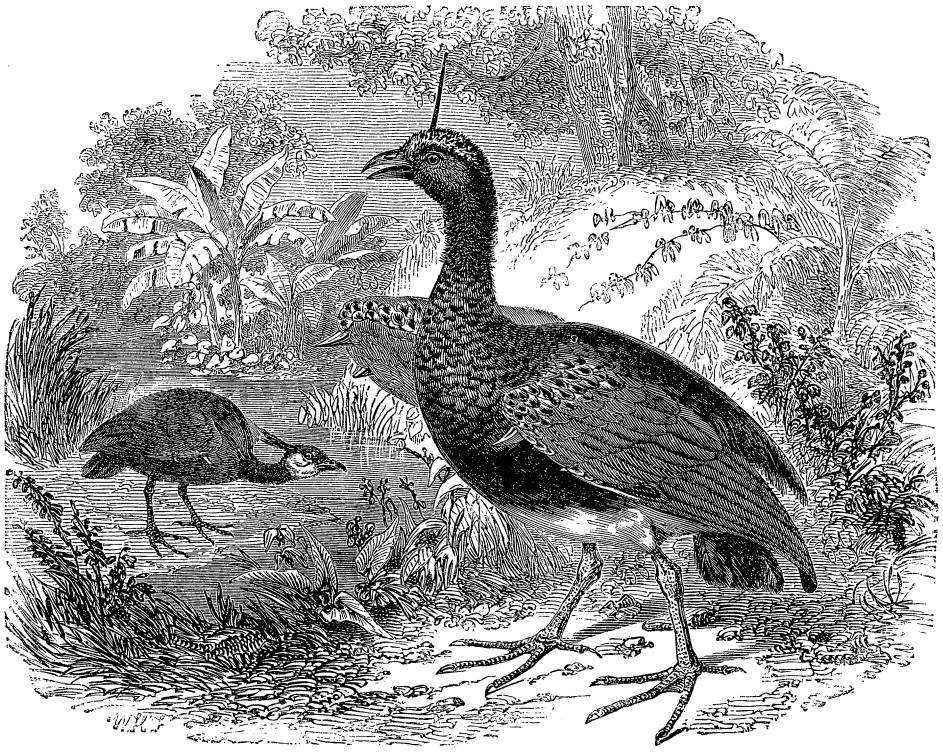


THE JACANA.

Genus PARRA: *Parra.*—To this belongs the JACANA, *P. jacana*, which is very numerous in Brazil. It has the wings armed with spines; the legs are long; the body light; the toes and claws exceedingly large, so that the bird can run with great ease on the floating leaves of aquatic plants. The claw of the hind toe resembles the blade of a lancet, whence this bird is called the *surgeon*. In running upon the leaves its feet sink a little, and hence it is said to have the appearance of walking on the water. Its food consists principally of vegetable substances. Other species are found in India and Africa. Another genus, analogous to the gallinules, is that of the

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Porphyrio, one species of which, *P. hyacinthinus*, is very beautiful, and found in Southern Europe as well as parts of Africa and Asia.



THE HORNED SCREAMER.

Genus PALAMEDEA: *Palamedea*.—To this belongs the KAMICHI or HORNED SCREAMER, *P. cornuta*, larger than a grouse; the plumage greenish-brown above, with a reddish spot on the shoulder; two strong spurs on the edge of each wing, and a pointed, triangular flexible horn, about three inches long, on the top of the head. Another remarkable peculiarity is, that the skin is separated from the flesh by a considerable interval, occupied by a loose, cellular structure, which is filled with air, so that the skin crackles under the pressure of the hand. The same curious arrangement is found in some gannets and cormorants. This bird is common in Guiana and Brazil, where it lives in pairs, in marshy places, feeds on grains and aquatic herbs, and makes the air resound with its loud, wild cries. It is called *Camouche* in Guiana, and *Anhima* in Brazil. The CHAJA, *Chauna chavaria*, is a closely-allied species, thirty-two inches long, and has a clarion-like note, uttered by night and day, whenever it is excited by a noise. It is domesticated with other fowls by the natives of Paraguay and Colombia, where it is found.

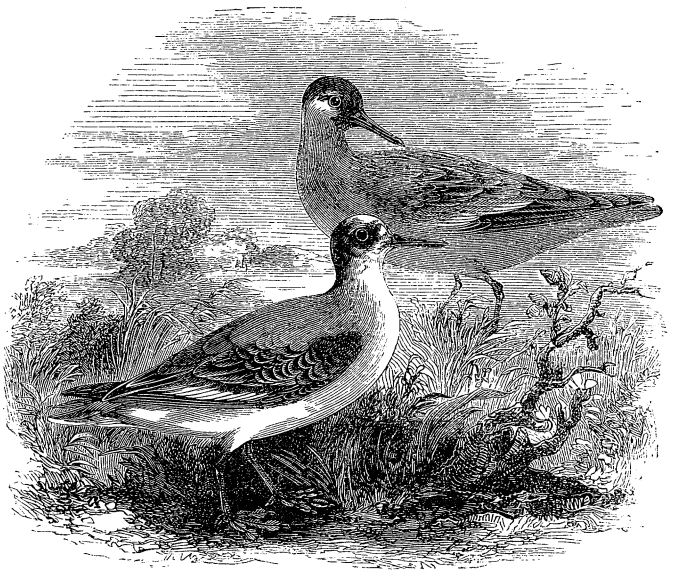
THE SCOLOPACIDÆ OR SNIPES.

This family includes several allied groups, as the *Phalaropes*, *True Snipes*, *Sandpipers*, *Curlews*, *Tatlers*, *Avocets*, &c.

THE PHALAROPES.

Genus PHALAROPUS: *Phalaropus*.—This contains the NORTHERN or GRAY PHALAROPE, —*phalarope* of the French—*P. platyrhynchus* or *P. hyperboreus*. The females are a little the largest; medium length eight inches; general color pearl-gray above, white beneath; feeds on thin-skinned crustaca and aquatic insects; eggs usually four. They procure their food principally upon the water, on which they alight like ducks, and float as light as gulls, and move about in search of food. The sight of a bank of floating sea-weed induces them to alight upon it, where

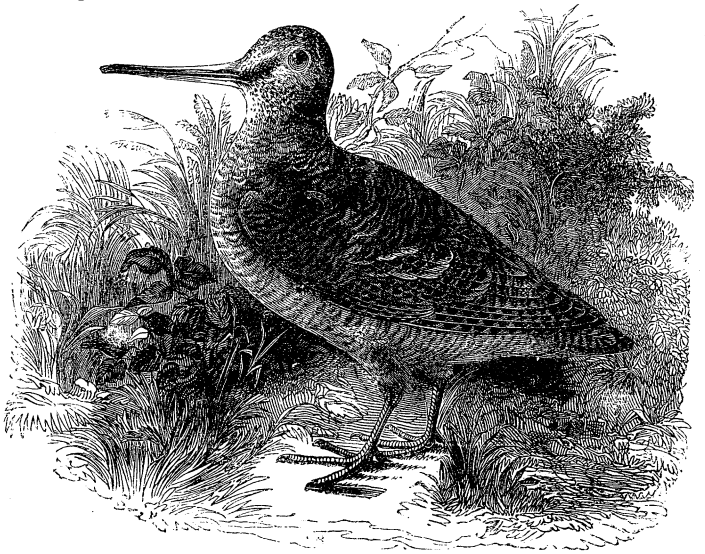
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THE GRAY PHALAROPE.

they walk about as much at their ease as on land. Their notes are *weet, weet, tweet,* uttered in a sharp, clear tone. In their spring and autumn migrations they assemble in flocks, and are often seen feeding on floating beds of sea-weed, a hundred miles from land. They breed in high northern latitudes of both continents during the summer, at which time they are seen in pairs. About August they move southward, and pay transient visits to the maritime parts of Europe, as well as to the Atlantic borders of the United States. They are said, also, to be found in California and Oregon.

Other species are the RED PHALAROPE, *P. fulicarius*, smaller than the preceding, resembling it, however, and distributed in the same countries; and WILSON'S PHALAROPE, *P. Wilsoni*, a beautiful species, ten inches long; irregular in its migrations, and rarely seen; distributed throughout temperate North America.



THE EUROPEAN WOODCOCK.

THE TRUE SNIPES.

Genus SCOLOPAX: *Scolopax.*—The most noted species is the EUROPEAN WOODCOCK—*Bécasse* of the French, *Beccaccia* of the Italians, and *Waldschnepfe* of the Germans—*S. rusticola.* It is thirteen inches long; weight fifteen to twenty-seven ounces; females a little the largest; color various mixtures of brown; bill very long and straight; the eye large; the eggs three to four, yellowish-white, blotched and spotted with gray; habits nocturnal, reposing during the day, and seeking its food, consisting chiefly of earthworms, at night. It is guided in its search by smell, and strikes its long, sensitive bill with unerr-

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ing certainty into the mud, where its prey is hidden. It also devours snails, slugs, small beetles, &c. It migrates by night in March and April, to high northern regions, where it breeds, and returns in August. It is one of the most noted of game birds, and great quantities are killed in the countries where they make a short stay in their migrations. It is common throughout Europe; a few breed in Great Britain. The nest is loosely made of dead leaves in a dry, warm spot among herbage. The female is attentive to her young, and when surprised will often carry them off in her claws, one at a time, to a place of safety.

The American Woodcock—*S. minor* of Bonaparte, *Philohela minor* of Gray—is but a trifle smaller than the preceding, which it greatly resembles in form and habits. It, however, does not proceed so far north for incubation. It appears in the Middle and New England States in March and April, and departs for countries south of the United States in October and November. It breeds from Maryland to the St. Lawrence. As in the preceding species, they are able to select their food by scent; they often feed in the night, and their eyes are set back in their head so as hardly to be used for the purpose of seeking the objects on which they feed. Their haunts are marshy thickets, where they turn over the fallen leaves and probe the mud, in pursuit of their prey. Whenever surprised in their hiding-places they rise in a hurried manner, but soon drop to the ground, then running along and lurking whenever they consider themselves safe. They are greatly esteemed as game, and are hunted with pointers or setters, and shot on the wing, They are common in the markets of Boston, New York, and Philadelphia from August to the 1st of November.

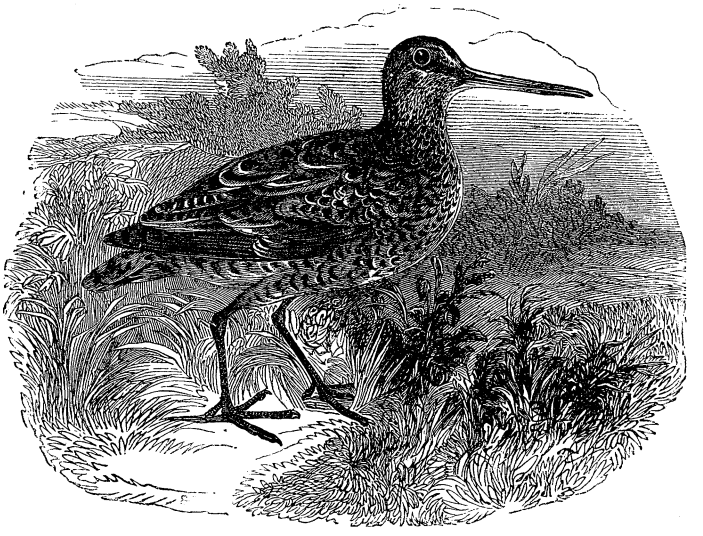
The Common European Snipe or English Snipe—*Bécassine* of the French—*S. gallinago*, is ten and a half inches long, the beak two and three-quarters; dark-brown spotted above; sides and neck pale-brown; breast and belly white. They breed in fens and marshes, and are migratory, moving to the North in March and to the South in November. Many of them, however, remain and breed in intermediate stations, through the summer. During incubation the male bird is often heard uttering a piping call to his mate. He also frequently ascends in a circling flight to an immense elevation, sometimes beyond the reach of vision, and then descends with great velocity, uttering, at the same time, a kind of plaintive, whistling sound, which is accompanied by a trembling motion of the wings. This takes place morning and evening, and sometimes during the day. It is found in all Northern Europe, Iceland, and Greenland; in winter it migrates to Egypt and Asia Minor.



THE COMMON EUROPEAN SNIPE

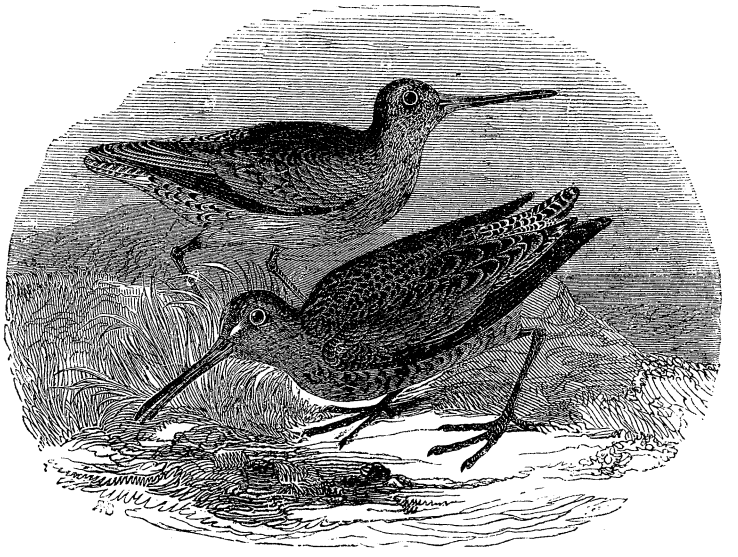
Other foreign species of Snipe are the Great Snipe, Double Snipe, or Solitary Snipe, *S. major;* twelve inches long; a fine species; habits like the preceding; found sparingly in various parts of Europe, from Italy to Sweden; and the Jack-Snipe, *S. gallinula—Bécassine sourde* of the French—eight inches long; solitary in its habits, and breeds as far north as Sweden, and visits the South of Europe in the winter. The Gray Snipe, Brown Snipe, or Red-breasted Snipe—*S. noveboracensis* of De Kay, *Macroramphus griseus* of Bonaparte, *Bécassine grise* of the French—is ten to eleven inches long; upper surface variegated with different shades of chestnut

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THE DOUBLE, OR SOLITARY SNIPE.

and black; beneath reddish chestnut barred with black. They move northward in April, and breed in the northern regions of this continent, amid the reedy and marshy borders of the great lakes, feeding on leeches, worms, insects, and small mollusca, which they extract from the mud with their long, dextrous bills. They move southward in July and August, now gathering along the sea-shore, and appearing in large flocks, performing their aerial evolutions over the marshes, sometimes uttering a short, rapid note, and sometimes a loud, querulous whistle. At this period



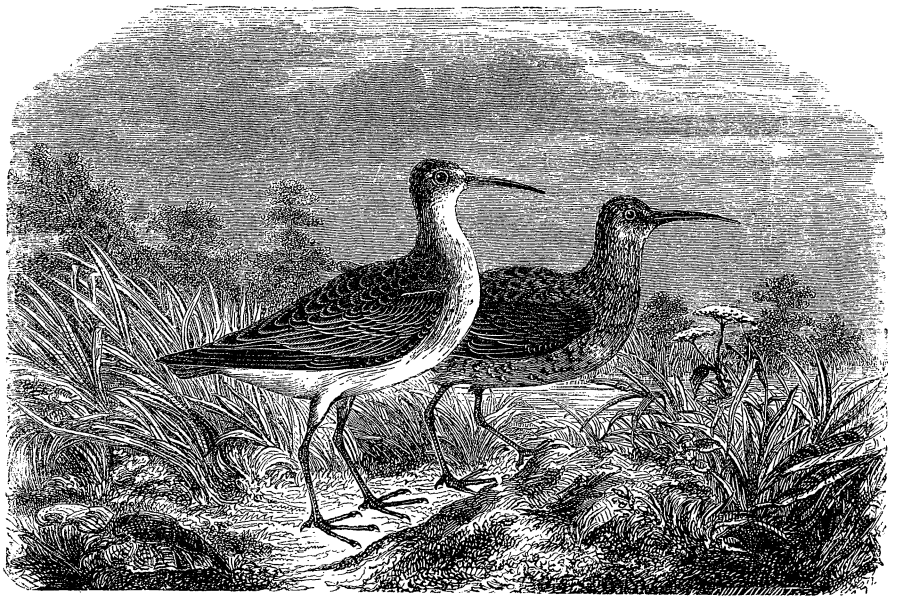
GRAY SNIPE.

large numbers of them are killed in the Middle States, their flesh, like that of the other snipes, being of exquisite flavor. This species, which is known in some parts by the name of *Dowitchee*, *Quail Snipe*, and *Brown Snipe*, is distributed over the temperate parts of North America, and a few specimens are seen in Europe from Sweden to Great Britain.

The Common American Snipe—*S. Wilsoni* of De Kay, *S. gallinago* of Temminck, often called *Wilson's Snipe*, and also *English Snipe*, from the fact that it closely resembles the Euro-

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pean bird of that name—is eleven inches long; brown and reddish above; beneath white; feeds on worms, leeches, and aquatic insects; migrates northward in March and April, and returns in July and August; breeds from Virginia to 55° north. It has the same habit as the English Snipe,—which somewhat resembles the practice we have described as belonging to the Night-Hawk—of making wide and lofty sweeps in the air, and then swiftly descending with a wailing, hovering sound, often heard in the gray of the morning and evening, and when the birds are invisible, and therefore seeming to come from spirits of the sky. It is almost nocturnal in its habits, and conceals itself with assiduity in the rank grass and herbage of the marshes which it frequents. Like many other birds of this family, it may be decoyed, while in flight, by an imitation of its call. Some of them remain among us until the frost hardens the earth and compels them to depart. Another species, the *Macroramphus scolopaceus*, is found throughout the temperate parts of North America. Sabine's Snipe, *S. Sabini*, is a rare European species, little known.



THE CURLEW SANDPIPERS.

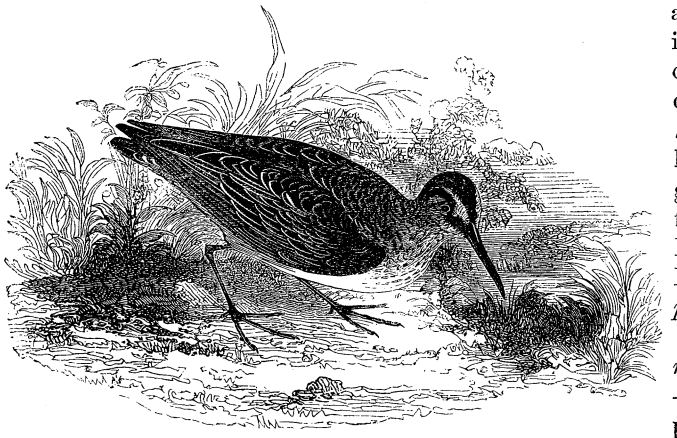
TRINGINÆ OR SANDPIPERS.

This family consists of small birds resembling the snipes, but having longer legs. They live in the neighborhood of water, and some of them swim with facility. They are migratory, breeding high in the North, and proceeding usually in flocks to the South in autumn. They run and fly rapidly; feed on worms, insects, and mollusca, which they extract from the soft, oozy soil of marshes. There are many species in Europe and America.

Genus TRINGA: *Tringa.*—The Curlew Sandpiper, *T. subarquata*, is about eight inches long; chestnut and black above; breast and belly reddish-chestnut. It breeds in Northern Europe and Asia, as well as in North America; in winter it is found in Africa, from Barbary to the Cape, and in the United States, along the Atlantic coast to Florida. It is, however, always a rare species. The Gray-Back of the United States, called Knot in England, *T. canuta*, is ten inches long; variegated above with black and brown, and beneath reddish-chestnut; abundant in Western Europe and Eastern North America. The Buff-breasted Sandpiper, *T. rufescens*—*Tryngites rufescens* of Baird—eight inches long; grayish-yellow above; beneath yellowish-red, spotted; found in Europe and North America. The Broad-billed Sandpiper, *T. platyrhyncha*, six and a half inches long; above varied with black, rufous, and gray; beneath grayish-white, tinged with buffish-red; rare, but distributed throughout Europe. The Little Stint, *T. minuta*, is six inches long; gray above; under surface white, with a dusky band across the neck; found

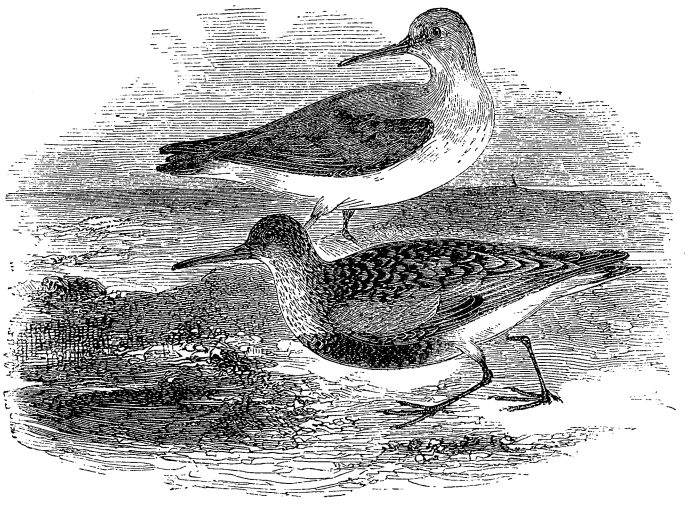
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throughout Europe. TEMMINCK'S STINT, *T. Temminckii*, five and a half inches long; ash-gray above; under parts white; found in Europe, North Africa, and India. The DUNLIN, *T. variabilis*, called also *Purre*, *Stint*, *Ox-Bird*, *Sea Snipe*, &c.—is eight inches long; above black, rufous, and gray; beneath black and white; found throughout Europe and North America. This is the RED-BACKED SANDPIPER, *T. alpina* of Audubon.



THE BROAD-BILLED ANDPIPER.

The PURPLE SANDPIPER, *T. maritima*—the *Knot* of Bewick—is eight and a half inches long; plumage bluish-lead color; found in Europe and North America; abundant from Maine to New York in spring and autumn. SCHINZ'S SANDPIPER—*T. Schinzii* of Gould and others—is six and a half inches long; dark ash above; grayish-white beneath; resembles the Dunlin; found throughout North America; common in New Jersey in autumn; accidental in Europe. The PECTORAL SANDPIPER, *T. pectoralis*—*T. maculata* of Vieillot, and



THE DUNLIN.

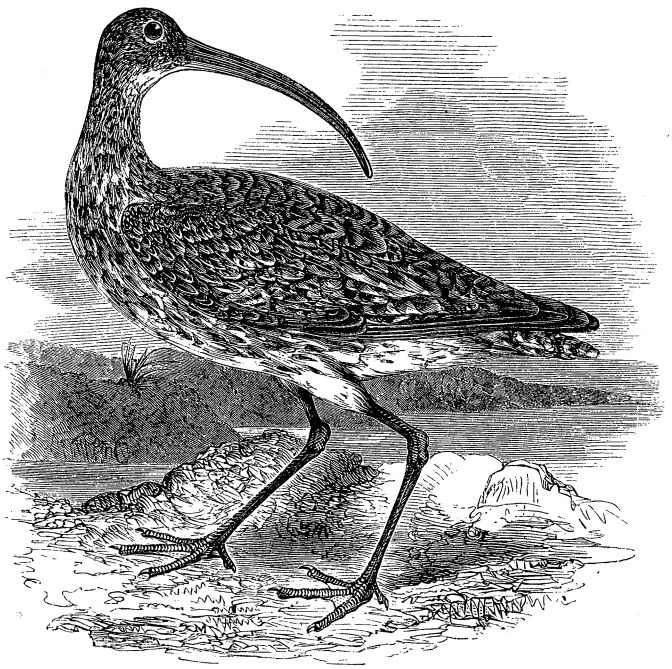
sometimes called *Jack-Snipe*, *Fat-Bird*, *Meadow-Snipe*, *Short-Neck*, &c.—is nearly nine inches long; dark brown above; grayish-white beneath; found in North America, and common along the Atlantic shores of the United States; accidental in Europe. WILSON'S SANDPIPER or LEAST SANDPIPER, *T. pusilla* or *T. Wilsoni*, is four and a half inches long; above black; beneath white. It pervades the whole of North America, and is well known on the coast by the names of *Peep* and *Ox-Eye*.

To this long list of Sandpipers may be added the *T. Cooperi* of Baird, found on Long Island, and the *T. Bonapartii* of Schlegel, found in North America east of the Rocky Mountains.

CURLEWS, TATLERS, STILTS, AVOCETS, GODWITS, ETC.

Genus **NUMENIUS**: *Numenius*.—This includes the *Curlews*, distinguished by a long, slender bill, curved downward. As among the snipes and sandpipers, so with the curlews the females are somewhat the largest. The COMMON CURLEW of Europe is the *Courlis* of the French, *Ciarlotto*

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THE CURLEW.

of the Italians, and *Keilhacke* of the Germans, *N. arquatus;* the female is twenty-four inches long, the male twenty-two; variegated above with brown, black, and white; beneath with pale and dark brown and white, streaked and spotted. Its nest is carelessly made of a few leaves; the eggs are four, and pear-shaped; the young run as soon as hatched. It lives along the sea-shore, and feeds on worms, slugs, small testaceans, and insects; its cry of *courlie, courlie*, has given it its English and French names. In Scotland it is called *Whaup*, which is a name for a goblin which is supposed to have a long beak and go about the houses after nightfall; hence we can understand the Highlander's prayer to be saved from witches and warlocks and "a' long-nebbed things." This species is widely distributed throughout Europe, Africa, Asia, and even the Asiatic and Australian Islands, visiting high northern regions in summer to breed, and moving southward as compelled by the freezing of the waters and marshes, where they obtain their food. Many proceed to the tropics, and others linger in more northern regions. Their flesh is excellent, and they are eagerly sought by the sportsmen, but are very difficult of approach.

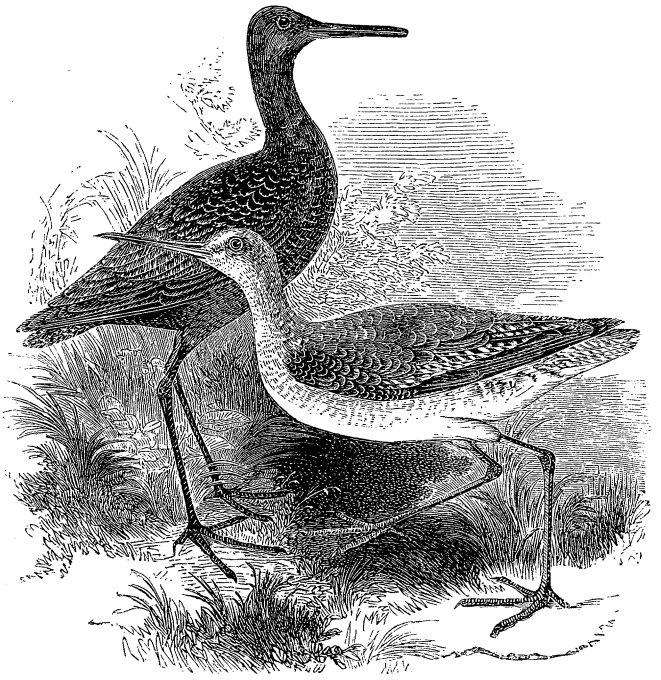
The Whimbrel, *N. phæopus*, is eighteen inches long, variegated above with brown, grayish-black, and grayish-white; beneath nearly white. In England, it is sometimes called *Half Curlew* and *Jack Curlew;* geographical distribution nearly as the preceding.

The Hudsonian Curlew, *N. Hudsonicus*, sometimes called *Jack Curlew*, and also *Short-billed Curlew*, is eighteen inches long; above brownish-black; beneath white, tinged with buff; its nest is built on the ground; the eggs four. It is migratory; appears in the Middle States in large flocks in the month of May; frequents the salt marshes, and feeds on small worms, land and marine insects, fry, minute shell-fish, and seeds of aquatic vegetables. At a later period, in June, accompanied by the long-billed species, it feeds on dewberries, crow-berries, &c. About this period it assembles from different parts of the marshes in a vast company, and moves away to the northern regions, usually setting out about an hour before sunset, and proceeding in a long angular phalanx, and cheering the way by a constant whistling. In consequence of their sympathy for each other, they readily descend at the call of their kindred, and this fact is taken advantage of by sportsmen to bring them within gunshot, by imitating their cry. During the latter part of August and first of September they arrive along the coast of New England and the Middle States, now frequenting the upland pastures as well as marshes, feeding on grasshoppers and

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berries. They soon depart, moving away to the south in large flocks. Their flesh is excellent, and they are tolerably abundant during the season in the larger city markets.

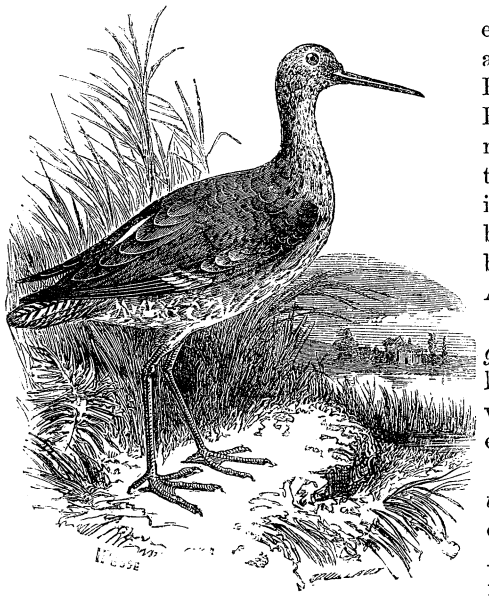
The Esquimaux Curlew, or Little Curlew, or Dough-Bird, *N. borealis*—the *Small Esquimaux Curlew* of Nuttall—is fourteen inches long; blackish-brown above, mottled with rufous-brown and gray; beneath yellowish-gray, streaked. Its range is very extensive—from Paraguay to 70° north. It is common along our coasts from August to November, when it proceeds southward. It is a great delicacy, and much sought after by sportsmen.



THE SPOTTED RED-SHANK.

The Long-billed Curlew, *N. longirostris*, known along our coast by the names of *Sickle-Bill* and *Big Curlew*, is twenty-five inches long; bill long, and curving downward in a remarkable degree toward the tip; the color blackish-brown, spotted with reddish and gray above; beneath reddish-buff; its food consists of small mollusca, insects, berries, worms, and crabs; common on the coasts of the Middle States from the middle of August to the middle of September; some linger till November. Its flesh is indifferent food; distributed throughout the temperate parts of North America. It is supposed there may be two or three species confounded in this one.

Genus TOTANUS: *Totanus.*—This includes several birds called *Tatlers*, which resemble the snipes and sandpipers, but have longer legs. The Spotted Red-Shank, *T. fuscus*—the *Chevalier brun* of the French—is twelve inches long; ash-gray above, beneath white. It inhabits the sea-shore, as well as the borders of rivers and lakes, feeding on worms, insects, and small testacea, and in search of these, burying itself to the breast in mud; it is migratory, breeds at the north, and is found in Europe and Asia.



THE COMMON RED-SHANK.

The Common Red-Shank, *T. calidris*—*Chevalier gambette* of the French—is ten and a half inches long; brown, with black spots, above; beneath white, with brown spots; spread over Europe; sedentary in France.

Bartram's Tatler, *T. Bartramius*—named *Bartram's Sandpiper* by Wilson, and known along our coast by the various names of *Gray Plover*, *Grass-Plover*, *Upland-Plover*, and *Field-Plover*—is twelve inches long; ferruginous, with small black streaks, above; beneath white; found on the Atlantic coast, from Texas to Nova Scotia; accidental in Europe. This is the *Actiturus Bartramius* of Bonaparte.

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The YELLOW-SHANK TATLER, *T. flavipes*—*Gambetta flavipes* of Bonaparte, known by sportsmen under the name of *Yellow-Legs*—is nine and a half inches long; above bluish-brown, varied with white, gray, and rufous; beneath white, streaked with gray. It is a common game bird along the coasts, ranging from Mexico to Labrador; accidental in Europe.

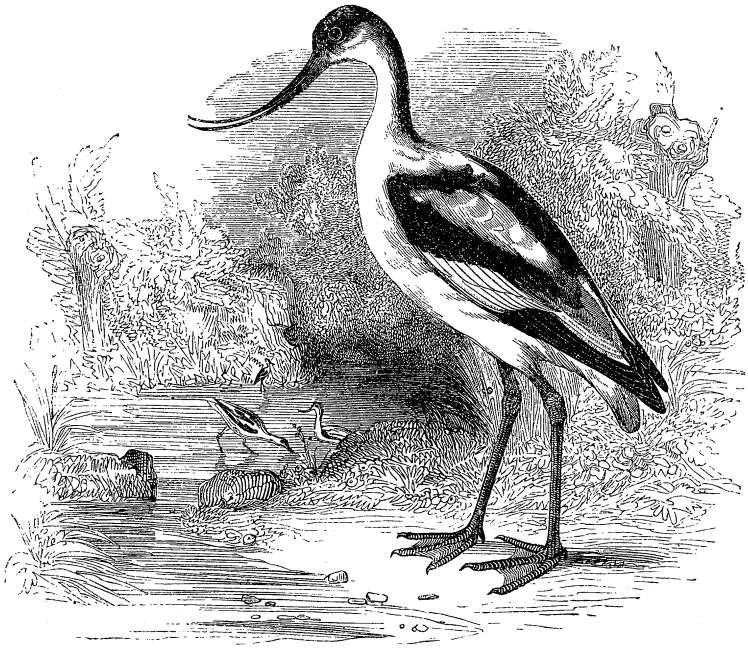
The GREEN SANDPIPER, *T. ochropus*, is nine and a half inches long; dusky-green above; beneath white, streaked with dusky lines; found in Europe, Africa, and Asia. The WOOD SANDPIPER, *T. glareola*, and SUMMER SNIPE, or COMMON SANDPIPER, *T. hypoleucos*, belong to the eastern hemisphere.

The SPOTTED SANDPIPER, *T. macularius*—*Tringoides macularius* of Gray, *Spotted Sand-Lark* of De Kay, and popularly known by the names of *Peet-weet*, *Teeter*, *Tiltup*, *Tipetail*, and *Humility*—is seven to eight inches long; glossy olive-brown, varied with blackish-white above; white-spotted beneath; frequents small streams and the borders of lakes, and feeds on insects and worms. Its cry is *peet-weet, peet-weet;* it has a constant tilting motion of the body, which has given it a long list of titles. It is familiarly known throughout the United States; ranges from Mexico to Labrador; accidental in Europe.

The GREEN-SHANK TATLER, *T. glottis*—*Florida Greenshank* of the Smithsonian Catalogue—is twelve inches long; green and brown above; beneath white; common in Europe and Asia; and is found occasionally on our coasts from New York to Florida.

The TELL-TALE TATLER or GODWIT, *T. melanoleucos*—*Gambetta melanoleuca* of Bonaparte, and called in this country the *Stone-Snipe*, *Varied Tatler*, *Big Yellow-Leg*, and *Winter Yellow-Leg*—is thirteen and a half inches long; blackish-brown above; lower parts soiled and spotted white; found from Mexico to Canada.

The WILLET, *T. semipalmatus*—*Ereunetes petrificatus* of Illiger, and sometimes called *Semipalmated Snipe*, and *Stone-Curlew*—is fourteen inches long, but varies much in size; marked with black, rufous, and grayish above; beneath gray, and tinted with brown; found in South America and temperate parts of North America.



THE AVOCET.

The SOLITARY TATLER, *T. chloropygius*, or *Rhyacophilus solitarius*—sometimes called *Solitary Sandpiper* and also *Jack-Snipe*, *Wood-Tatler*, and *Green-Rump Tatler*—is eight and a half inches long; deep brown above; beneath light gray; found in Mexico and temperate parts of North

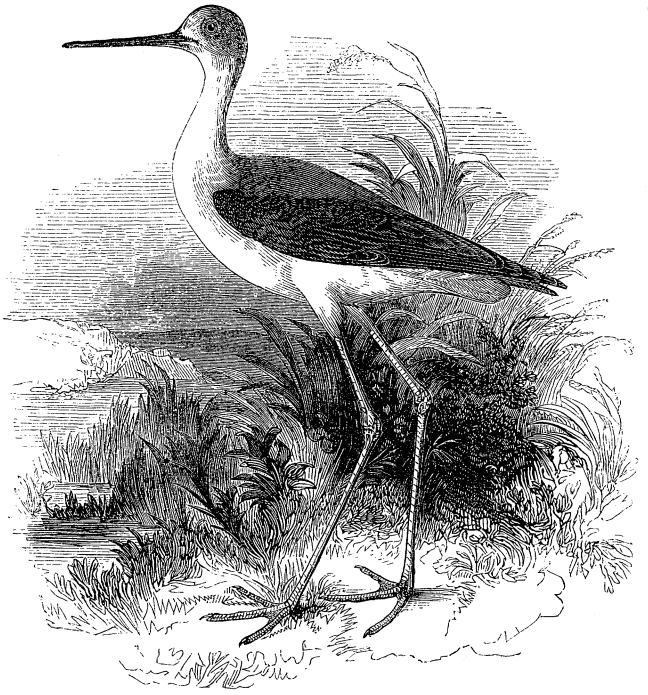
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America. The WANDERING TATLER—*Heteroscelus brevipes* of Baird—is found along the Pacific coast and Northeastern Asia.

Genus RECURVIROSTRA: *Recurvirostra.* This includes the *Avocets* or *Avosets.* The AVOCET of Europe, *R. avocetta*—sometimes called *Scooper* and *Cobbler's-awl-Duck* in England—is a very curious bird, with a long bill, turned upward, and appearing like a thin piece of whalebone; legs long and semipalmated, furnishing a support in walking over the mud; length eighteen inches; color white, with black on the wings and neck; food, worms, aquatic insects, and thin-skinned crustacea, which the bird seizes with admirable dexterity in the mud with its slender, sensitive bill. The nest is made in a depression in a dry part of the marshes; eggs two. It has an incessant cry of *twit, twit.* It is migratory, and distributed in Europe, Africa, and Asia; breeds in Great Britain. There are two or three other foreign species.

The AMERICAN AVOCET, *R. Americana*—called *Blue-Stocking* in New Jersey—is eighteen inches long; color white; tail tinged with pale ash; back and wings black; bill four inches long, and unlike the preceding, turns up along nearly its whole length, and at the tip turns down, and ends in a fine point; ranges from the tropics to 68° north; breeds in New Jersey; migrates north in May and south in October.

Genus HIMANTOPUS: *Himantopus.*—This includes the Stilts, remarkable for the length of their legs. The EUROPEAN or BLACK-WINGED STILT, *H. melanopterus*—*Echasse* of the French—is about fourteen inches long; the legs extremely long and slender; it runs easily on the land, and flies with great swiftness. It frequents the borders of the sea, and feeds on worms and small mollusca, and makes its nest in marshes, laying four bluish-green eggs; found, though not abundantly, in Eastern Europe; migrates to Asia and Africa in winter. The WHITE-HEADED STILT of Australia is described by Gould as associating in flocks of six to twenty, and running along the streams, and often knee-deep in water, with admirable ease and grace.



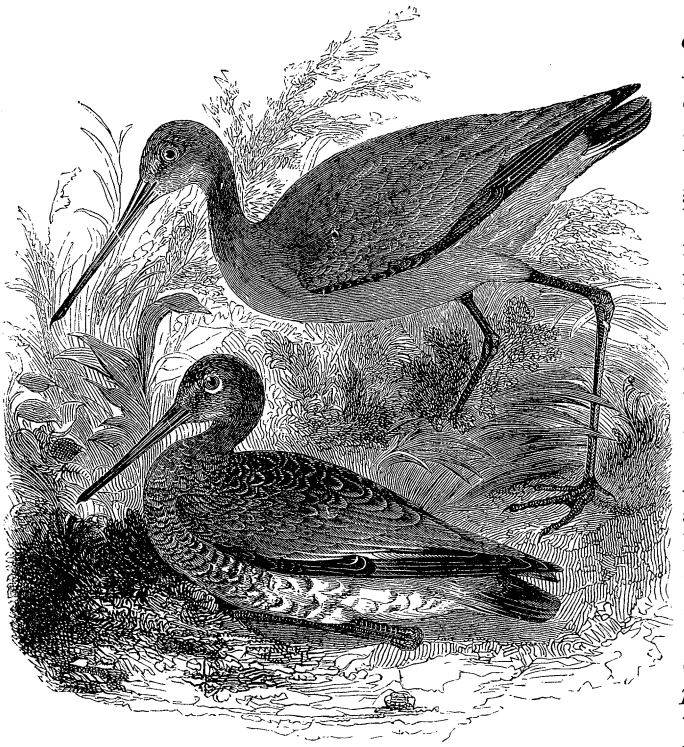
THE BLACK-WINGED STILT.

The AMERICAN STILT, *H. nigricollis*, is thirteen and a half inches long; general color dark sooty brown; ranges from Mexico to Massachusetts, and is a winter resident from Carolina southwardly. De Kay says: "It is known under the various names of *Tilt, Stilt, Longshanks*, and *Lawyer*. The origin of this last popular name, which is most in use, I have not been able to discover. There appears to be nothing unusual in *the length of its bill.*"

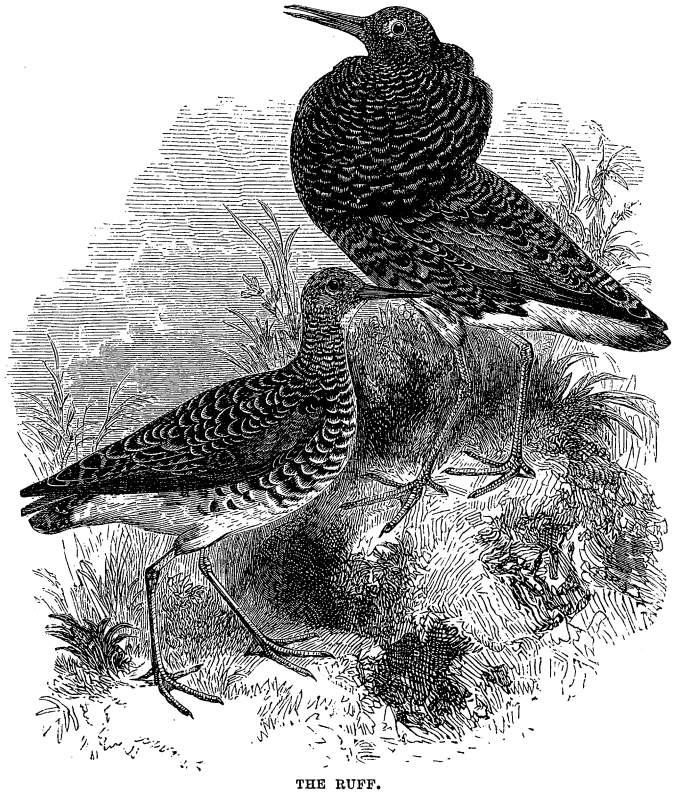
Genus MICROPALAMA: *Micropalama.*—This includes the LONG-LEGGED or STILT SANDPIPER, *M. himantopus;* nine inches long, and found throughout North America.

Genus LIMOSA: *Limosa.*—This includes the *Godwits*, noted for long bills slightly turned upward, and long legs. The BLACK-TAILED GODWIT, *L. melanura*, is sixteen inches long; dark brown above; beneath white, barred with rufous brown; found throughout Europe in spring and summer; frequent on the fens of Lincolnshire, England, where the bird-catchers occasionally fat them on bread and milk for market. The BAR-TAILED GODWIT, *L. rufa*, is a European species, chiefly distinguished from the preceding by having shorter legs.

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BLACK-TAILED GODWITS.



THE RUFF.

The MARLIN, *L. fedoa*—also called *Great Marbled Godwit*, *Red Curlew*, *Straight-billed Curlew*, and *Dough-Bird*—is sixteen and a half inches long; above brown, varied with rufous and gray; beneath pale reddish-brown or buff; feeds on aquatic insects, leeches, small grubs, shell-fish, and worms; breeds at the North; returns in large flocks in August, and remains in the Middle States till November; ranges throughout temperate North America.

The RING-TAILED MARLIN, *L. Hudsonica*—called *Goose-Bird* around Boston—is fifteen and a half inches long; found in Eastern North America; common in New Jersey.

Genus MACHETES: *Machetes.*—This includes the RUFF, *M. pugnax*, the only known species; twelve inches long; weight of the bird, when fat, ten ounces; above of a shining purplish-black, barred with chestnut; beneath white. The male is distinguished by a ruff or tippet of feathers around the neck, these falling off in June, attended by an entire change of plumage. It is farther noted for a remarkable pugnacity, very opposite to the general peaceful disposition of the grallatorial birds, as is also the practice of polygamy in which it indulges, and which is indeed the cause of the continual fighting that goes on during the breeding season. Montagu, in describing a conflict between two of these birds, says, "Their actions in fighting are very similar to those of a game-cock; the head is lowered, and the beak held in a horizontal direction; the ruff, and indeed every feather, more or less distended, the former sweeping the ground as a shield to defend the more tender parts; the auricles erected, and the tail

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partly spread—upon the whole assuming a most ferocious aspect. When either could obtain a firm hold of the bill, a leap succeeded, accompanied by a stroke of the wing; but they rarely injured each other." These birds, with the females, called *Reeves*, are taken alive in the fenny districts of England, and fattened upon bread and milk or boiled wheat, before being sent to market, where they fetch from thirty shillings to two guineas, or more, per dozen. They are also imported into London from Holland. They are migratory, and the range is extensive over Europe and Asia. A specimen of this is said to have been found on Long Island.

THE ARDEIDÆ OR HERONS.

This family includes several groups of remarkable birds, generally of stately forms, stalking majestically along, or standing sedately still, watching for their prey. Their legs are long and slender; the bill long and strong; the wings large and powerful. They frequent the margins of water, feeding upon small aquatic animals of various kinds. They are generally migratory, some of them performing very long journeys.

Genus PLATALEA: *Platalea.*—This includes the *Spoonbills*, distinguished by the very singular form of their bills, which are flattened, gradually narrowed from the base to a little beyond the middle, and expanded at the extremity into a flat oval disc. The toes are connected by membranes at the base. The COMMON WHITE SPOONBILL—*P. leucorodia* of Europe, *Cucchiaorone* of the Italians, *Spatule* of the French, *Löffel Gans* of the Germans—is about thirty or thirty-



THE ROSEATE SPOONBILL.

two inches in length, and is generally distributed over the continent of Europe, but is a rare bird in England. It is found in Africa, as far south as the Cape of Good Hope, and in India. It is migratory in its habits, retreating to the South of Europe and North Africa during the winter, and advancing far to the north during the summer to breed. One of its favorite summer residences, however, is Holland, where it occurs in great numbers. Its food consists of small fishes, mollusca, worms, and insects.

The ROSEATE SPOONBILL, *P. ajaja*, is two feet six inches long; plumage of a beautiful rose-color; the wings carmine. It is common in the West Indies, Guiana, Mexico, and the southern parts of the United States. It lives along the sea-coasts and the mouths of rivers, where it is seen

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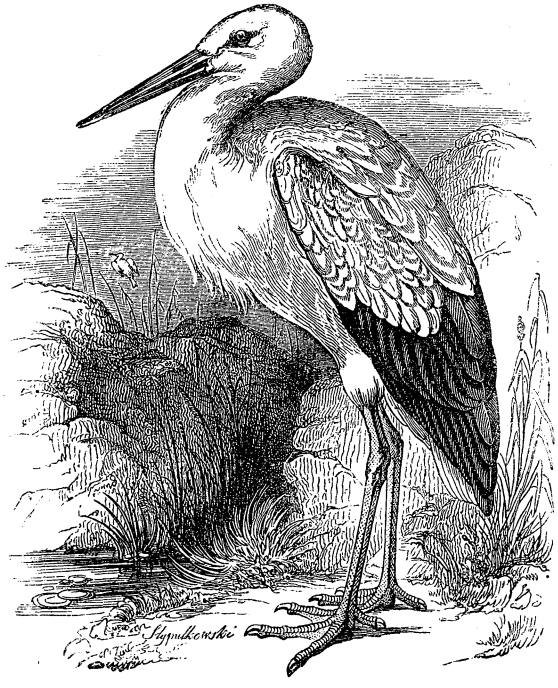
moving about in quest of shell-fish, marine animals, small snails, and fish. In pursuit of these it sometimes swims and dives. This species, as well as the others, live in communities during the breeding season, and often feed by twilight.

Genus IBIS: *Ibis.*—Of this there are several species. The GLOSSY IBIS, *I. falcinellus—I. Ordii* of Bonaparte—is two feet long; of a dark green above, and a fine reddish-brown beneath; the whole plumage being silky and glossed with purplish bronze. It frequents the borders of rivers, lakes, &c., and feeds on worms and mollusca. It is common in Southern Europe, and parts of Africa and Asia. It is supposed to be the *Black Ibis* of the ancients. This species is occasionally found in the United States. Some authors, however, believe the ibis met with on this continent to be distinct from the European one, though closely resembling it.

The SACRED IBIS, *I. religiosa*, is twenty-three inches long; plumage white; the wings tipped with black; found throughout Africa, and occurs abundantly in Egypt, where it was regarded with great veneration by the ancient Egyptians, who kept them in their temples, and embalmed them after their death; thousands of their remains are still found in the burial places amid the ruins of ancient Egypt. Various reasons have been given for this custom, some saying that the Ibis destroyed the noxious serpents which were so numerous in that country; others that there was supposed to be some analogy between the plumage of the bird and one of the phases of the moon; while a third opinion is that the birds were regarded with favor, because, their annual migration into Egypt taking place at the period of the rising of the Nile, they were considered as the harbingers of that event. This bird, often called the WHITE IBIS—*I. alba* of De Kay and others—is also found, though rarely, in the Gulf Atlantic States.

The SCARLET IBIS, *I. rubra*, is twenty-three inches long, of a fine scarlet color, and is found along the shores of tropical America; is occasionally seen in the southern parts of the United States. It is sometimes domesticated and associates with the poultry.

The WOOD IBIS, *Tantalus loculator*, is according to Wilson, three feet two inches long, of which the bill forms nine inches; general color white; quills dark glossy green and purple. Its haunts are along the margins of rivers, and amid marshes and meadows; found from Brazil to the Southern States.



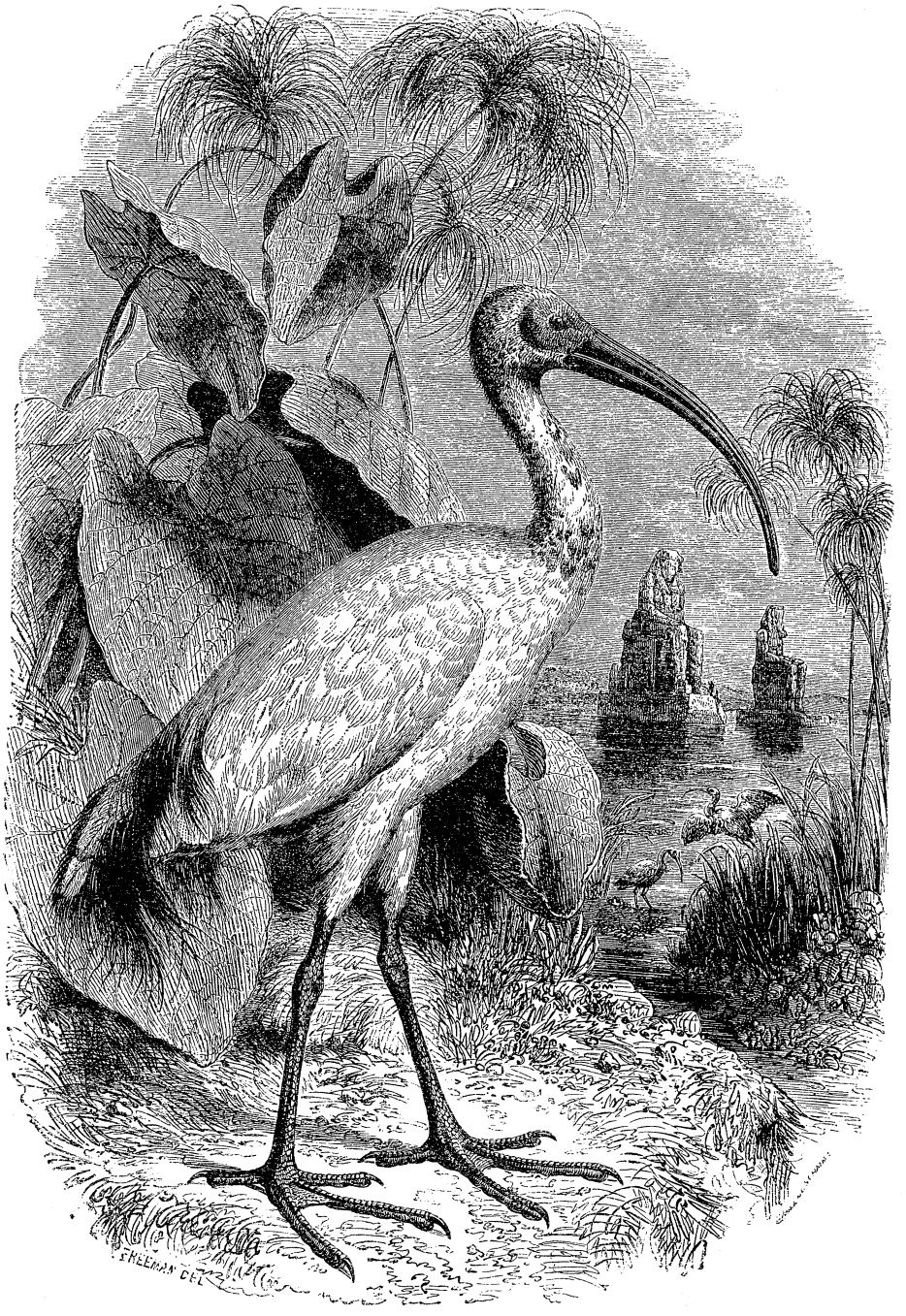
THE WHITE STORK.

CICONINÆ, INCLUDING ADJUTANTS, JABRIUS, STORKS, &c.

Genus CICONIA: *Ciconia.*—This includes the *Storks*, which are large birds, chiefly inhabiting the warmer regions of the earth, where they frequent marshy places, feeding upon reptiles, batrachians, fishes, and other small animals, not excluding small quadrupeds and birds. Many of them devour indiscriminately almost any thing that comes in their way, including garbage of all kinds; hence, like the vultures and other carrion-eating animals, they are regarded with great favor by the inhabitants of warm climates. Several species perform long migrations, visiting temperate and cold climates during the summer; but the majority appear to be permanently resident in warm countries.

The best-known species is the WHITE STORK, *C. alba*, which is about three feet and a half in length, and is of a white color, with the quills and coverts of the wings black, and the bill and feet red. These birds visit the central parts of Europe in the spring, and remain there during the summer, departing usually in the month of October for their

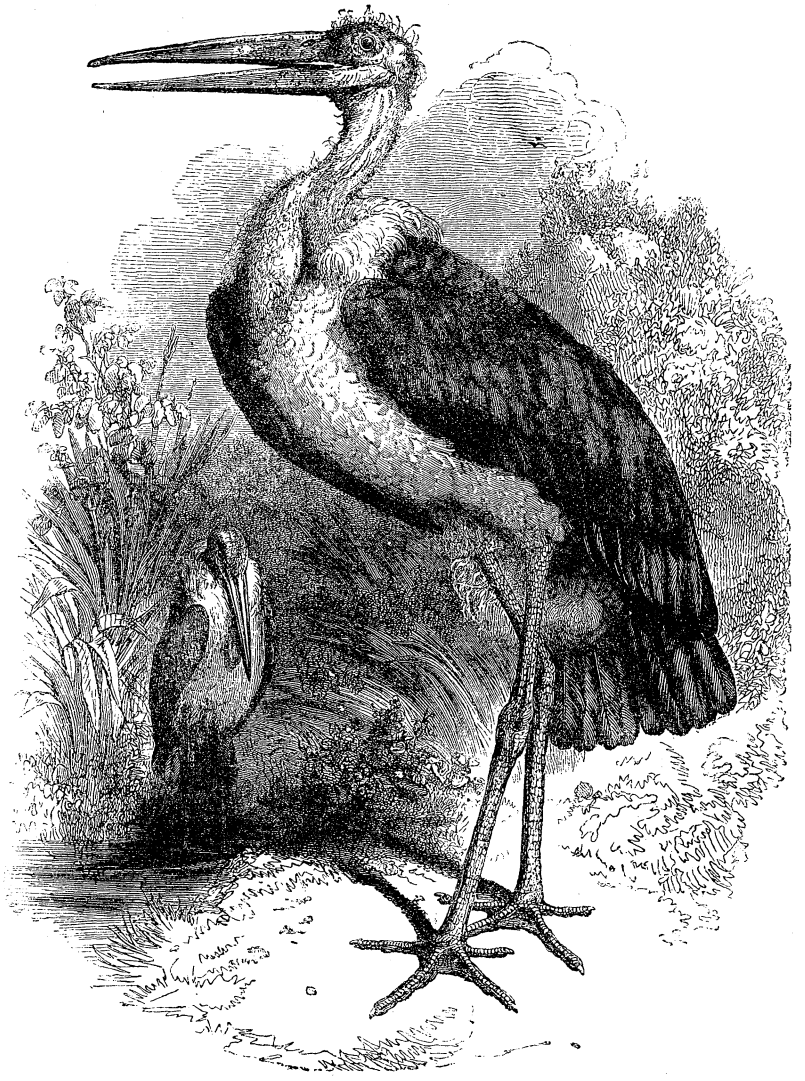
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THE SACRED IBIS.

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THE MARABOUT STORK. (See p. 286.)

winter-quarters in Asia and Africa. They are very common in Holland and parts of Germany. Their services in the countries frequented by them, in the destruction of vermin of all kinds, prevent their being the objects of any molestation; they are, therefore, generally very fearless of man, and frequently build their nests on the tops of the houses in the very centers of towns; indeed, in many places, the inhabitants place wooden boxes or frames on the tops of their houses to induce these birds to build there; and the man whose house is selected by one of them for this purpose, always considers himself particularly fortunate. They return annually to breed in the same place, and manifest great delight on again taking possession of their deserted home.

The nest is formed of a mass of sticks and other coarse materials, in which the bird lays three or four eggs, which are hatched in about a month, and the young are then tended with great care by both parents, who feed them by inserting their bills into the mouth of the young bird, and disgorging some of the half-digested food from their own stomachs. The old birds manifest the greatest attachment to their young, which has rendered them objects of admiration in all ages. A most remarkable instance of this occurred in the conflagration of Delft, where a female stork was observed, after repeated attempts to carry off her young, to prefer remaining with them to

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perish, rather than leave them to their fate. They are also generally regarded as patterns of conjugal fidelity.

The Black Heron, *C. nigra*, is somewhat smaller than the preceding, and is more rare; found in Eastern Europe.

Genus LEPTOPILOS: *Leptopilos*, includes the Adjutant, *L. Argala*, which inhabits India and the Asiatic slands. It often stands as much as five feet in height, and measures seven feet and a half from the extremity of the bill to that of the toes. It has a large, slightly bent bill; the head and neck are nearly bare, and in front of the neck is a large pouch, which hangs down like a dewlap, and is capable of being inflated. Its voracity is extreme; it devours every thing that comes in its way, and swallows a rabbit, a cat, or even a leg of mutton, at one mouthful; and, from its services as a scavenger, its presence is encouraged in Calcutta and other large towns; it is even sometimes domesticated. Great care is necessary to keep provisions out of its way, as otherwise they would quickly disappear. In a wild state these birds live in companies, generally frequenting the mouths of rivers, where, at a distance, they look not unlike a party of men engaged in picking up shell-fish on the beach.

The Marabout Stork, *Leptopilos marabou*, is found in the tropical portions of Africa, where it frequents the vicinity of the negro villages, and assists the vultures in their filthy avocation of clearing away garbage. It is even more singular in its ugliness than the Indian species; but it is from this bird that the beautiful plumes known as Marabout feathers are obtained. These feathers grow under the wings.

Genus MYCTERIA: *Mycteria*.—This includes the *Jabirus*, which are little inferior in size to the Adjutants, and which they resemble in their mode of life. One species, which has the head and neck bare, is found in South America; those of the old world have those parts of the body clothed with feathers.

Genus ANASTOMUS: *Anastomus*.—This includes the *Open-Bills*, of which there are several species, and which are about the size of the common Stork: they inhabit the warmer regions of Asia and Africa. A species found at the Cape, the *A. lamelliger*, which is of a brown tint, with a purplish metallic gloss, is remarkable for having the tips of the stalks of nearly all the feathers terminated by a shining black horny disc of an oblong form.

THE ARDEINÆ OR TRUE HERONS.

These resemble the Storks, but are smaller, and some are of diminutive size. They are solitary in their habits, frequenting the margins of lakes and rivers, or marshy places in which there are numerous pools of water, wading into the shallows in search of their prey, which consists principally of fish, and often standing motionless for a long time, watching until some fish passes within their reach, when they suddenly dart out the neck with great rapidity, seize their prey with their strong bills, and generally swallow it at once. Occasionally, either by design or accident, they transfix the fish with one of the mandibles; and Mr. Yarrell has given an account of a case in which a heron struck its beak through the head of an eel, piercing both eyes, when the eel, finding itself unable to escape, coiled itself round the neck of the heron so tightly as to prevent the bird from breathing, and they were both found dead in this situation! They walk gravely, and with a certain amount of elegance, and possess great power of flight, although they rarely fly very fast. At the breeding season they usually quit their customary solitude, and collect into communities of variable number. Their nests are broad and flat, formed of sticks, twigs, and similar materials, and placed sometimes on the ground and sometimes on trees. At this period they also frequently leave the sequestered spots in which they pass the greater part of their time, and approach nearer to the habitations of man, often building their nests in the large trees surrounding some old mansion. Most of these birds are migratory. Their flesh was formerly much esteemed, and pursuing them with falcons was one of the highest sports of the middle ages. The heron was then called *Heronshow*, and not to know the *hawk* from the *heronshow* was deemed an evidence of great stupidity. Hence we have the vulgar proverb, *not to know a hawk from a handsaw*.

Genus ARDEA: *Ardea*.—This includes the common European species, the Gray or Crested Heron, *A. cinerea*, upward of three feet in length, of a bluish-gray tint above, white beneath, and

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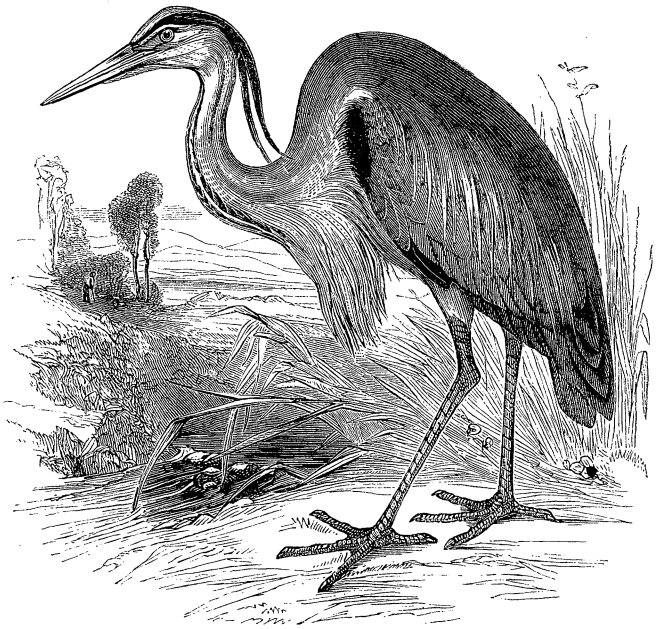


JABIRU.

FLAMINGO

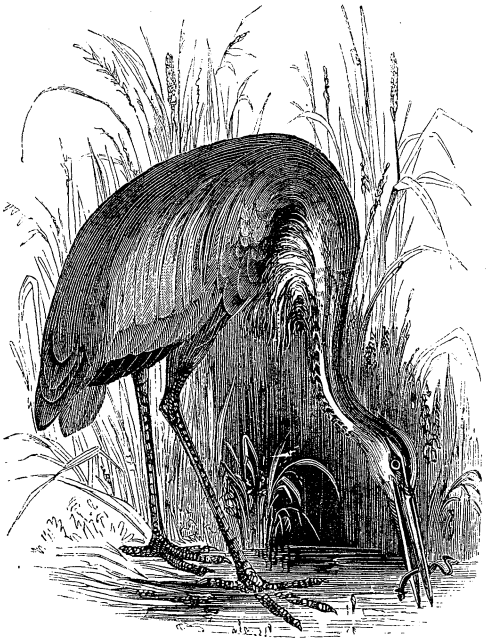
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THE GRAY HERON OF EUROPE.

furnished with a black crest attached to the back of the head. This bird is very common throughout Europe in summer, and a few remain during the winter in Middle and Southern Europe; the greater part, however, spend this season in the warmer parts of Africa and Asia. It frequents the lakes, rivers, and inland morasses during the breeding-time, and usually betakes itself to the estuaries and sea-coasts in the winter. It is generally an indolent bird, commonly capturing its prey by standing in the water until some fish passes close enough to it to be seized by darting out the head. It also feeds upon frogs, newts, crustacea, and insects, and occasionally upon small birds and quadrupeds. It always swallows its prey entire. It often feeds at night, as is also the case with many of the family.

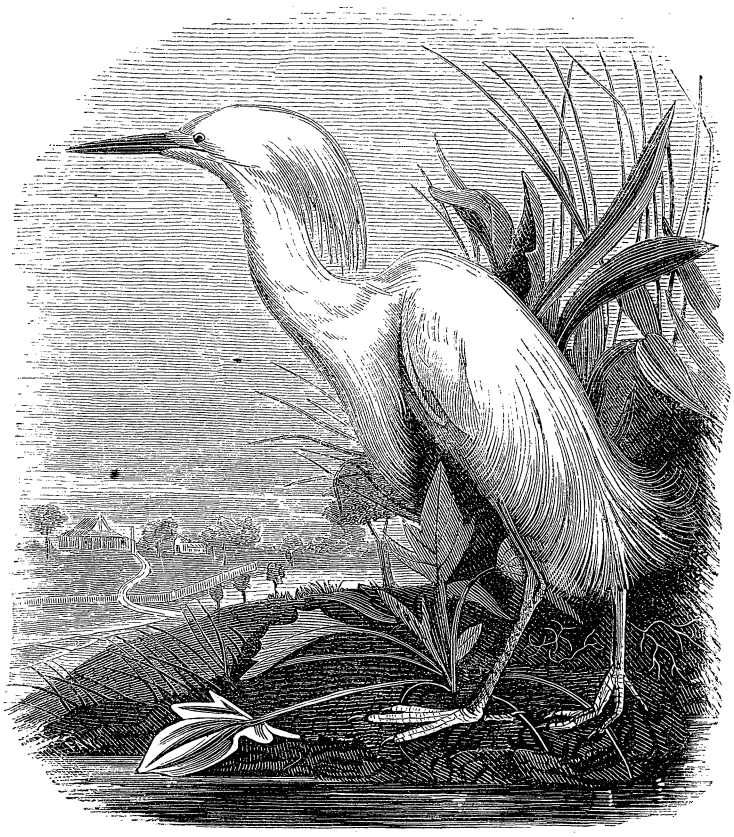


THE PURPLE HERON.

Other foreign species are the PURPLE HERON, *A. purpurea*, twenty-nine inches long; slate-gray above; dark maroon and slate-gray beneath; found in the warmer parts of Europe, Asia, and Africa: the GREAT WHITE HERON, *A. alba*, three feet long; plumage white; common in Southern Europe, and rare at the north; found in parts of Asia: the EGRET HERON or LITTLE EGRET, *A. garzetta*, plumage white; common in Southern Europe and in parts of Asia: the BUFF-BACKED HERON, *A. russata*, two feet long; plumage white, except the head and upper part of the neck, which are buff; occasional in Europe; common in India: the SQUACCO HERON, *A. comata*, nineteen inches long; reddish-brown, buff, and white above; beneath white.

The GREAT BLUE HERON, *A. herodias*, is four feet long; general color bluish-ash. "It

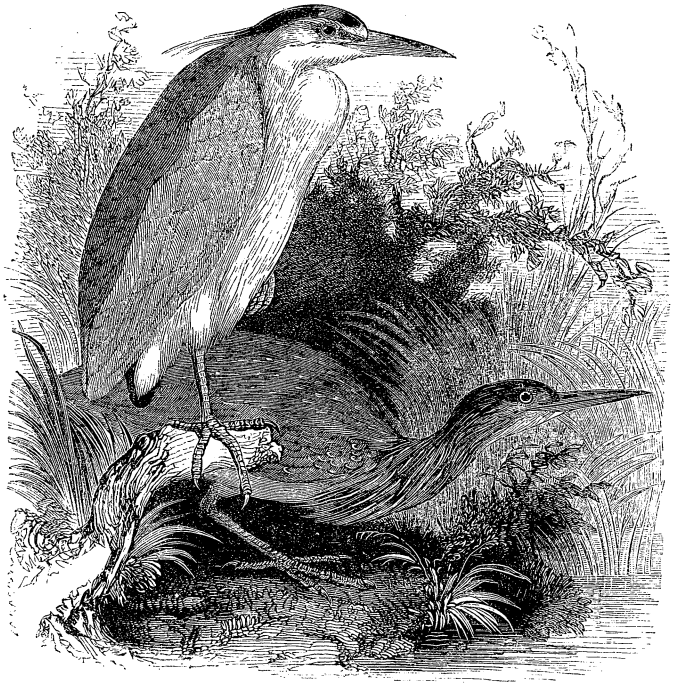
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THE GREAT WHITE HERON OF AMERICA. (See p. 290.)

is," says Wilson, "a constant inhabitant of the Atlantic coast, from New York to Florida; in deep snows and severe weather, seeking the open springs of the cedar and cypress swamps, and the muddy inlets occasionally covered by the tides. On the higher inland parts of the country, beyond the mountains, they are less numerous, and one which was shot in the upper parts of New Hampshire was described to me as a great curiosity. Many of their breeding places occur in both Carolinas, chiefly in the vicinity of the sea. In the lower parts of New Jersey they have also their favorite places for building and rearing their young. These are generally in the gloomy solitudes of the tallest cedar swamps, where, if unmolested, they continue annually to breed for many years. These swamps are from half a mile to a mile in breadth, and sometimes five or six in length, and appear as if they occupied the former channel of some choked up river, stream, lake, or arm of the sea. The appearance they present to a stranger is singular—a front of tall and perfectly straight trunks, rising to the height of fifty or sixty feet, without a limb, and crowded in every direction, their tops so closely woven together as to shut out the day, spreading the gloom of a perpetual twilight below. On a nearer approach, they are found to rise out of the water, which, from the impregnation of the fallen leaves and roots of the cedars, is of the color of brandy. Amid this bottom of congregated springs the ruins of the former forest lie piled in every state of confusion. The roots, prostrate logs, and, in many places, the water, are covered with green, mantling moss, while an undergrowth of laurel, fifteen or twenty feet high, intersects every opening so completely as to render a passage through, laborious and harassing beyond description; at every step you either sink to the knees, clamber over fallen timber, squeeze yourself through between the stubborn laurels, or plunge to the middle in ponds made by the uprooting of large trees, which the green moss concealed from observation. In calm weather the silence of death reigns in these dreary regions; a few interrupted rays of light shoot across the gloom;

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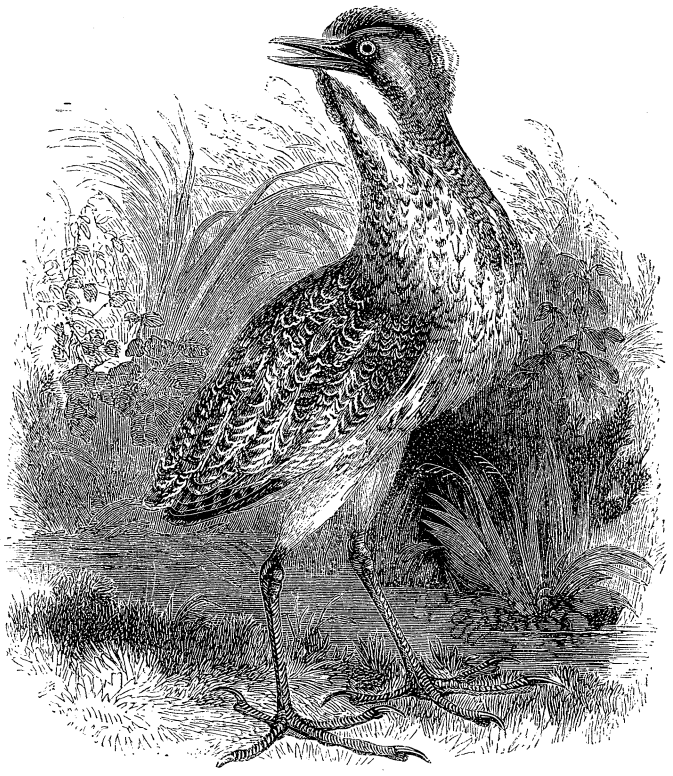
THE EUROPEAN NIGHT HERON.

and unless for the occasional hollow screams of the herons, and the melancholy chirping of one or two species of small birds, all is silence, solitude, and desolation. When a breeze rises, at first it sighs mournfully through the tops; but as the gale increases, the tall, mast-like cedars wave like fishing-poles, and rubbing against each other, produce a variety of singular noises, that, with the help of a little imagination, resemble shrieks, groans, growling of bears, wolves, and such like comfortable music. On the tops of the tallest of these cedars the herons construct their nests, ten or fifteen pair sometimes occupying a particular part of the swamp. The nests are large, formed of sticks and lined with smaller twigs; each occupies the top of a single tree. The eggs are generally four, larger than those of a hen, and of a light greenish-blue, without any spots. The young are produced about the middle of May, and remain on the trees until they are full as heavy as the old ones, being extremely fat, before they are able to fly. They breed but once in the season. If disturbed in their breeding place, the old birds fly occasionally over the spot, sometimes honking like a goose, sometimes uttering a coarse, hollow, grunting noise, like that of a hog, but much louder.

"The principal food of the great heron is fish, for which he watches with the most unwearied patience, and seizes them with surprising dexterity. At the edge of the river, pond, or sea-shore, he stands fixed and motionless, sometimes for hours together. But his stroke is quick as thought, and sure as fate, to the first luckless fish that approaches within his reach; these he sometimes beats to death, and always swallows head foremost, such being their uniform position in the stomach. He is also an excellent mouser, and of great service to our meadows in destroying the short-tailed or meadow-mouse, so injurious to the banks. He also feeds eagerly on grasshoppers, various winged insects, particularly dragon-flies, which he is very expert at striking, and also eats the seeds of that species of nymphæ usually called *spatterdocks*, so abundant along our fresh-water ponds and rivers."

The Black-crowned Night-Heron, *A. discors*—*Nyctiardea Gardeni* of Baird—is twenty-five inches long; general color white; has a light crest; derives its name from its nocturnal habits, being usually seen flying at night or in the evening, and utters a sonorous cry of *quaw* or *quawk*, whence it is often called the *Quawk* or *Qua Bird*. It is very similar to the Night-Heron of Europe, *Nycticorax Gardeni* of Yarrell.

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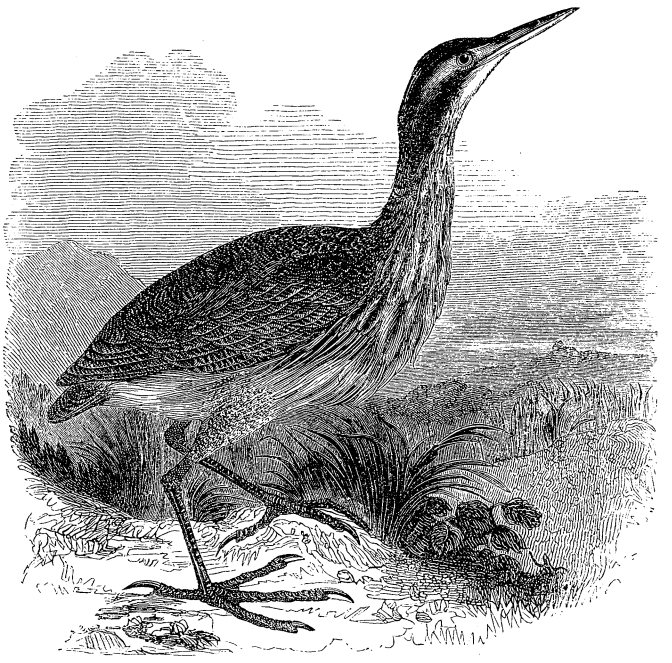
THE COMMON BITTERN OF EUROPE.

Other American species are the AMERICAN GREAT WHITE HERON—*A. leuce* of De Kay, *Ardea egretta* of Wilson, *Audubonia occidentalis* of Bonaparte—forty inches long; snowy white, frequently with a tinge of yellow; closely resembles the *Great White Heron* of Europe, and was formerly supposed to be of the same species; found from New Jersey south to the West Indies: the WHITE-CRESTED HERON or SNOWY HERON, *A. candidissima—Garzetta candidissima* of Bonaparte—twenty-two inches long; snowy white; found on the coast of the Middle and Gulf States, and across to California: the BLUE HERON, *A. cærulea—Florida cærulea* of Baird—twenty-two inches long; color slate-blue; found from New Jersey south to the West Indies: the LOUISIANA HERON, *A. Ludoviciana—Demiegretta Ludoviciana* of Baird—rare in the Middle and common in the Southern States: and the YELLOW-CROWNED NIGHT-HERON, *A. violacea—Nycherodius violaceus* of Baird—found in the Gulf States and South America.

There are several smaller species of heron, usually called *Bitterns*, and ranged by some naturalists under the generic name of *Botaurus*, of which the following are the principal.

The COMMON BITTERN OF EUROPE, *A. stellaris—Botaurus stellaris* of Gould—is twenty-eight to thirty inches long; upper parts brownish-buff, irregularly marked with black and reddish-brown spots; under surface buff, with streaks of brown. It feeds at night on frogs, lizards, small birds, and fishes; during the day it usually conceals itself among flags, rushes, or other rank vegetation. It has a peculiar booming cry, which, in connection with its nocturnal habits and character, makes a gloomy impression on the mind. Goldsmith says: "Those who have walked in a summer's evening by the sedgy sides of unfrequented rivers, must remember a variety of notes from different water-fowl; the loud scream of the wild goose, the croaking of the mallard, the whining of the lapwing, and the tremulous neighing of the jack-snipe. But of all these sounds there is none so dismally hollow as the booming of the *Bittern*. It is impossible for words to give those who have not heard this evening call, an adequate idea of its solemnity. It is like the interrupted bellowing of a bull, but hollower and louder, and is heard at a mile's distance, as if issuing

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THE AMERICAN BITTERN.

from some formidable being that resided at the bottom of the waters. This is the bittern, whose windpipe is fitted to produce the sound for which it is remarkable, the lower part of it, dividing into the lungs, being supplied with a thin, loose membrane, that can be filled with a large body of air and exploded at pleasure. These bellowings are chiefly heard from the beginning of spring to the end of autumn, and are the usual calls during the pairing season." It is found in Southern Europe and in parts of Asia and Africa.

The LITTLE BITTERN, *B. minutus*, is thirteen inches long; it is a native of Southern Europe, the southwestern parts of Asia, and the greater part of Africa.

The AMERICAN BITTERN, *A. minor* or *B. lentiginosus*, is twenty-six inches long, of a rusty yellow color, mottled with brown. In its habits it resembles the European bittern, having a similar booming cry. It is familiarly known by the names of *Poke*, *Indian Hen*, *Indian Pullet*, *Look-up*, *Stake-Driver*, and by the French in Louisiana, *Garde-soleil*. It ranges throughout nearly the entire continent of North America; accidental in Europe.

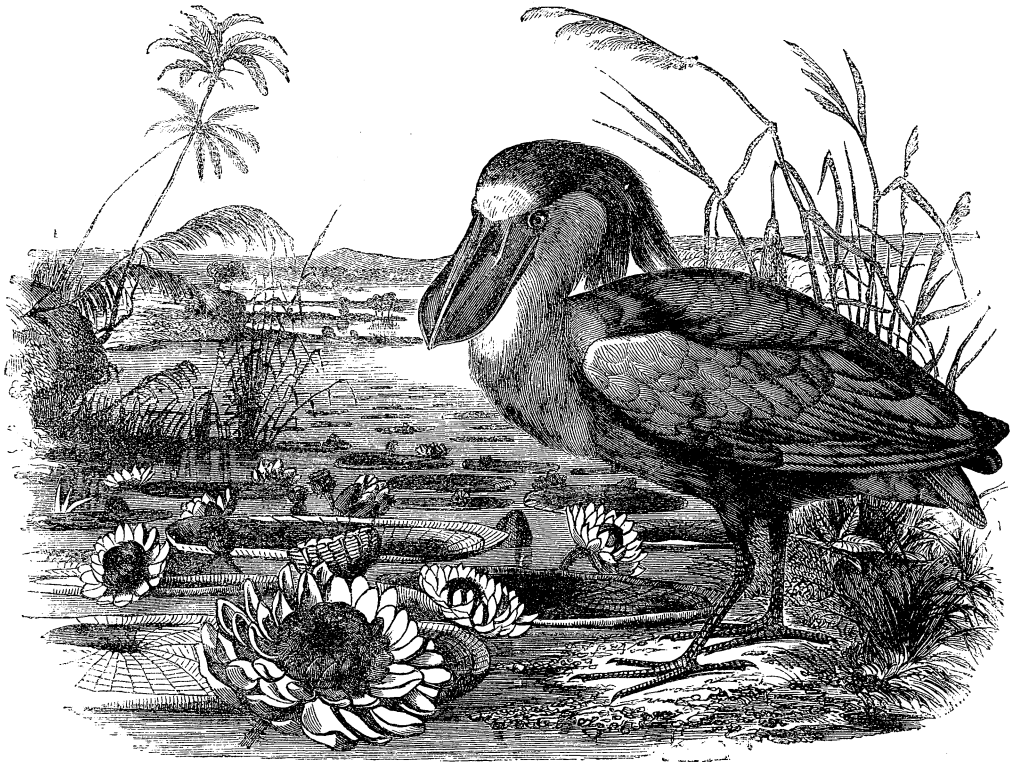
Other American species are the GREEN HERON, *A. virescens* or *Butorides virescens*, which is seventeen inches long; it has a slight crest; glossy green above, chin and throat whitish, spotted with brown. It lives in marshy situations, feeding on small reptiles and fishes. It has received the vulgar names of *Poke*, *Chalk-Line*, *Fly-up-the-Creek*, and, to speak the truth, the questionable epithet of *Schytepoke* is very commonly applied to it. It is found throughout the United States.

The LEAST BITTERN, *A.* or *Ardetta exilis*, is ten inches long; chestnut above and white beneath; found throughout the United States. There are still other species on the remote western frontiers of North America.

THE BOAT-BILLS, &c.

Genus CANCROMA: *Cancroma*.—This includes the BOAT-BILL or CRESTED SAVACOU, *C. cochlearia*, which is about the size of a domestic hen. Its beak resembles a boat reversed, having a strong ridge or keel down the middle of the upper mandible, and the sides spread out and bowed. In the male, the upper part of the neck and breast are dirty white; the back and lower part of the belly rusty-reddish. The legs and feet are brown. From the head depends a long crest of feathers, falling backward. The female has the top of the head black, without the elon-

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THE BOAT-BILL.

gated crest; the back and the belly rusty-reddish; the wings gray; the forehead and rest of the plumage white; the bill, legs, and feet brown. This species inhabit Cayenne, Guiana, and Brazil, and chiefly frequent such parts as are near the water. Here they perch on the trees which hang over the streams, and like the kingfisher, drop down on the fish that swim beneath. They also feed on reptiles and crabs, whence the French name of *Crabier* or *Crab-Eater*. Night is the season of their activity. Their sight is acute, and their stroke surprisingly rapid. Their body is light, their wings ample, and their flight lofty.

Genus BALŒNICEPS: *Balœniceps*.—Of this we know but a single species, *B. rex*, an extraordinary bird, found along the borders of the White Nile, in Eastern Africa. Its height is three feet nine inches; its color is of an ashy-gray above, and light gray beneath. Its habits are little known, but it is believed to live in marshes and to feed on mollusca and reptiles.

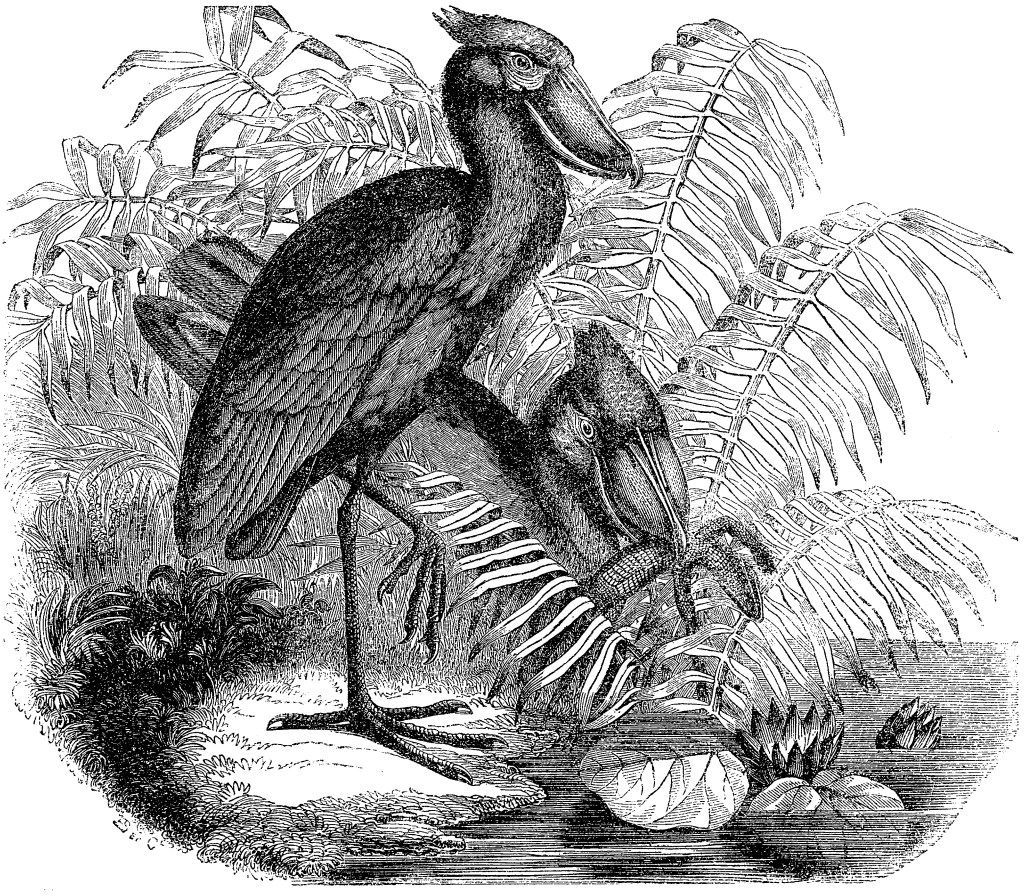
THE CHARADRIIDÆ OR PLOVERS.

Of these birds there are several genera and numerous species, widely distributed throughout the world. They are in general gregarious, feeding in flocks. They are less strictly aquatic in their habits than the preceding families, some of them, indeed, frequenting the margins of rivers, lakes, and ponds, or the sea-shores, while others are found upon moors and pastures, and even in plowed fields. Most of them perform considerable migrations, visiting the high northern latitudes during the summer for the purpose of breeding. They generally lay their eggs in a mere cavity in the sand or gravel, and the young run about soon after they are hatched. Several species are well known in this country, and are among our most interesting game birds.

OYSTER-CATCHERS AND TURNSTONES.

Genus HÆMATOPUS: *Hæmatopus*.—This includes the *Oyster-Catchers*. In the European Oyster-Catcher, *H. ostralegus*, the hind toe is wanting; the bill is much longer than the head,

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THE BALŒNICEPS.

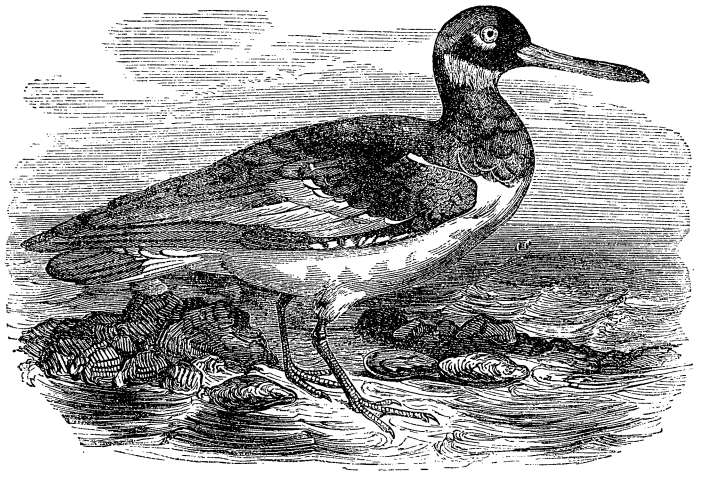
slightly bent upward, pentagonal at the base, and compressed into a thin plate toward the apex, which is abruptly truncated. It is a handsome bird, about eighteen inches in length; its plumage is variegated with black and white, whence the name of *Sea-Pie*, which is occasionally applied to it in England. It is commonly found on the sea-coasts, where it wades about seeking its food, consisting principally of mollusca and young crabs. It is said to detach limpets from the rocks with great facility, and its bill, from its peculiar form, appears particularly adapted for opening large bivalves, such as the oyster, and from this, no doubt, its common English name is derived. It appears, however, that it generally contents itself with the smaller bivalves, which it is able to swallow whole, together with worms and marine insects.

The Finns hold this bird in detestation, for they say it gives notice to the seals when the hunters are approaching. It is distributed throughout Europe in summer, but is stationary in England, Southern Europe, and North Africa. It pairs in spring and unites in flocks in winter.

The American Oyster-Catcher, *H. palliatus*, is seventeen inches long; above black and ash-color; beneath white; feeds on oysters and marine bivalves; breeds from Texas to Labrador; common on our Atlantic coasts; sometimes called *Flood Gull;* flesh tough and unsavory. Bachman's Oyster-Catcher, *H. niger*, is found on the Northwestern coast of North America, There is, perhaps, another species in the same regions—*H. ater* of Baird, *H. Townsendi* of Audubon.

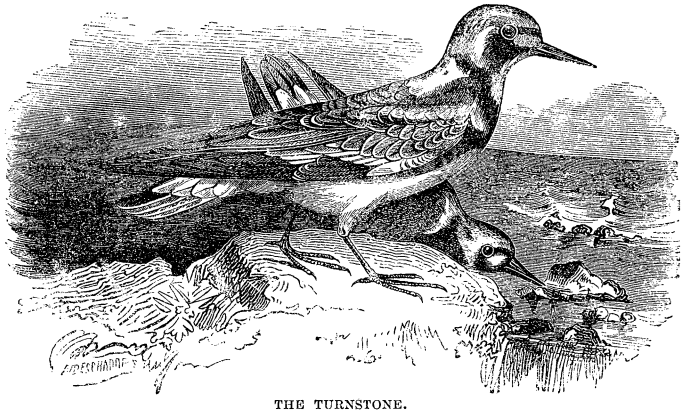
Genus STREPSILAS: *Strepsilas.*—This includes the *Turnstones*, which receive their name from their habit of turning over the stones with their bills, as they walk along the sea-shores, to find insects and small crustacea, on which they feed. The Common Turnstone of Europe,

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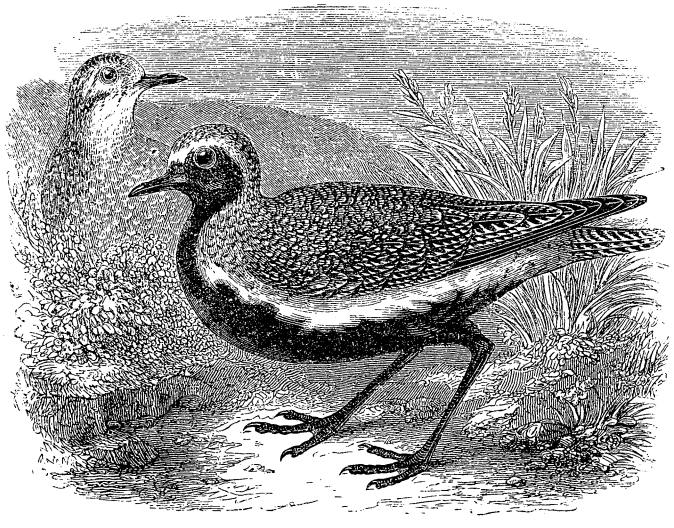


THE EUROPEAN OYSTER CATCHER.

S. interpres, is nine inches long; black, red, gray, and white above; breast black; beneath white. It is a handsome bird, and distributed over nearly all parts of the world. It visits Southern Europe in August, and retires to the north in May. In our Middle States it arrives from the south in April and proceeds north in May. It returns in September, and soon proceeds south; a few winter in the Southern States. With our coast gunners it is known by the names of *Brant-Bird*, *Heart-Bird*, *Beach-Bird*, and *Horse-foot Snipe*, the latter given to it because it feeds on the eggs of the horsefoot, *Limulus polyphemus*. The Black Turnstone, *S. melanocephalus*, is found in Western North America.



THE TURNSTONE.



THE GOLDEN PLOVER.

THE TRUE PLOVERS.

Genus CHARADRIUS: *Charadrius*.—This includes the Golden Plover of Europe, *C. pluvialis*, which, like the rest of the family, is a bird of powerful flight, and is consequently widely distributed. It is eleven inches long; greenish-black above, the feathers tinged with golden yellow; the under surface black; subject, however, to very distinct changes of plumage. They breed at the North of Europe, and proceed in large flocks to the South in autumn. Many of

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them remain through the winter in the southern parts of England, France, and Italy. They frequent moors, heaths, downs, and wide, open fields. Many also are seen along the sea-shores.

The American Golden Plover, *C. Virginicus*, is ten and a half inches long, mottled above with black and greenish-yellow; beneath marked with large patches of black. On this continent it ranges from 23° to 70° north, and is popularly known to sportsmen by the names of *Frost-Bird* and *Green-Back*. Nuttall says: "They arrive on the coast of the Middle and Northern States in spring and early autumn. Near to Nantasket and Chelsea Beach, they are seen, on their return from their inclement natal regions in the north, by the close of August, and the young remain in the vicinity till the middle of October, or later, according to the state of the weather. They live principally upon land-insects, or the larvæ and worms they meet with in the saline marshes, and appear very fond of grasshoppers. About the time of their departure they are, early in a morning, seen sometimes assembled by thousands, but they all begin to disperse as the sun rises, and at length disappear high in the air for the season. They usually associate, however, in small flocks and families, and when alarmed while on the wing, or giving their call to those who are feeding around them, they have a wild, shrill, and whistling note, and are at most times timid, watchful, and difficult to approach. Though they continue associated in numbers for common safety during the day, they disperse in the evening, and repose apart from each other. At day-break, however, the feeling of solitude again returns, and the early sentinel no sooner gives the shrill and well-known call, than they all assemble in their usual company. At this time they are often caught in great numbers by the fowler, with the assistance of a clap-net, stretched before dawn in front of the place they have selected to pass the night. The fowlers, now surrounding the spot, prostrate themselves on the ground when the call is heard, and as soon as the birds are collected together, they rise up from ambush, and by shouts, and the throwing up of sticks in the air, succeed so far in intimidating the plovers that they lower their flight, and thus striking against the net, it falls upon them. In this and most other countries, their flesh in the autumn, and particularly that of the young birds, is esteemed a delicacy, and is often exposed for sale in the markets of our principal towns." This species has been supposed identical with the European Plover, but it is now generally regarded as distinct; it is supposed, however, to be identical with the *Asiatic Plover*, known in India, the Asiatic Islands, and New Holland.

The Dotterel, *C. morinellus*, is nine and a half inches long, varied above with brown, ash, buff, and white; breast fawn, belly black. Its migrations resemble those of the *C. pluvialis*. They are regarded as silly birds, and hence a foolish person is in England called a *dotterel*. They are greatly esteemed for the table, and many are taken in nets. Drayton alludes to its habits, and to the popular idea that it imitates the actions of the fowler, as follows:

> "The Dotterel, which we think a very dainty dish,
> Whose killing makes such sport as no man more can wish.
> For as you creep, or cower, or lie, or stoop, or go,
> So, mocking you with ease, the apish bird doth do;
> And acting every thing, doth never mark the net,
> Till he be in the snare which men for him have set."

Other foreign species of Plover are as follows: the Ringed Plover, *C. hiaticula*, eight inches long; distributed throughout Europe, and for a long time erroneously considered as identical with our *Ring-Neck:* the Kentish Plover, *C. Cantianus*, seven inches long; common in Middle and Southern Europe: and the Little Ringed Plover, *C. minor*, resembling the *C. hiaticula;* found throughout Europe.

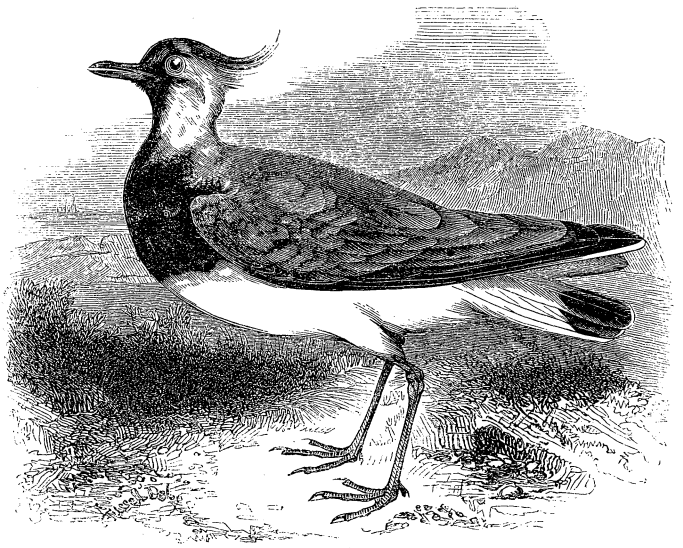
The American Ring Plover, *C. semipalmatus—Aegialitis semipalmatus* of Bonaparte—is seven inches long; brownish-ash above, beneath white; frontlet and ring over the breast, black; breeds as far north as Labrador, and is common on our shores from August to October, after which it migrates southward. Some, however, are stationary in the Southern States. It is often called *Ring-Plover*, and, as we have stated, has been supposed identical with the European *Ringed-Plover*.

The Piping-Plover, *C. melodus—A. melodus* of Ord—is six and a half inches long; found along the eastern coast of the United States, and is known among our fowlers by the names of *Beach-Bird* and *Beach-Flea*. It appears among us in April and disappears in October.

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Wilson's Plover, *C. Wilsonius* or *A. Wilsonius*, seven inches long; breeds from Connecticut to Texas. The Kildeer-Plover, *C. vociferus* or *A. vociferus* of Linnæus, is brownish-olive above; rump orange; beneath white. It takes its name from its cry, *kildeer, kildeer*, constantly repeated; breeds from Texas to Massachusetts; in summer is seen on gravelly plains in the interior; in winter it lives along the sea-shore; feeds on worms, nocturnal insects, and grasshoppers. Its flesh is little esteemed. The Mountain Plover, *A. montanus*, is found in Western North America.

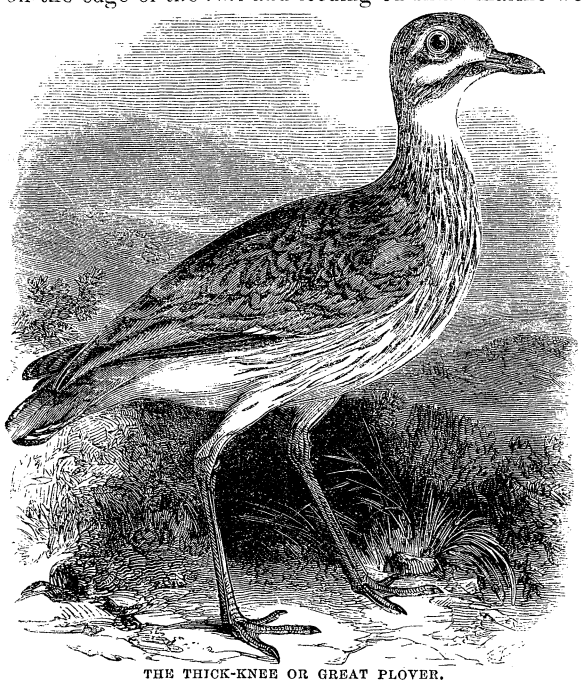
Genus SQUATAROLA: *Squatarola.*—This includes the Gray Plover, *S. cinerea*—*S. Helvetica* of Linnæus—twelve inches long; found throughout North America, and the sea-coasts of most northern and temperate regions. It is called *Whistling-Plover*, *Bull-Head* and *Black-bellied Plover* by sportsmen.



THE LAPWING.

Genus APHRIZA: *Aphriza.*—This includes the Surf-Bird, *A. virgata*, of the Pacific coasts of North and South America, and the Sandwich Islands.

Genus CALIDRIS: *Calidris.*—This includes the Sanderling or Sanderling Plover, *C. arenaria;* eight inches long, and regarded by some naturalists as rather a Sandpiper than a Plover. It is usually found along the sea-shore, often running upon the edge of the surf and feeding on small marine worms, small fishes, and crustaca. It is ash-gray above, beneath white, and is found throughout the temperate regions of Europe and North America; also in South America.



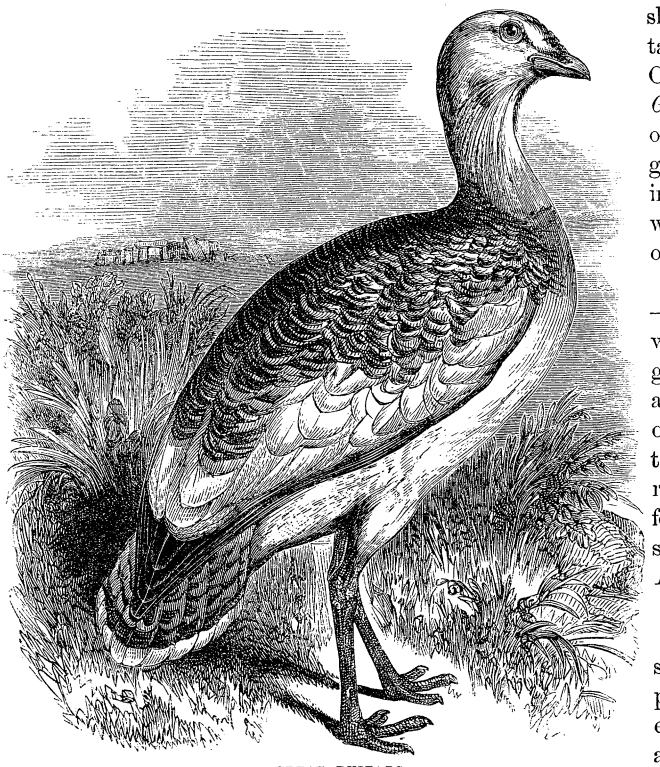
THE THICK-KNEE OR GREAT PLOVER.

Genus VANELLUS: *Vanellus.*—This includes the Lapwing or Peewit, *V. cristatus*—*Dixhuit* of the French—twelve inches long; above varied with green, black, and reddish-chestnut; breast black; belly white; a numerous species distributed throughout Europe and parts of Africa and Asia. The name of *Peewit* is given to this species from its cry; the slow flapping of its long wings is the origin of its other designation.

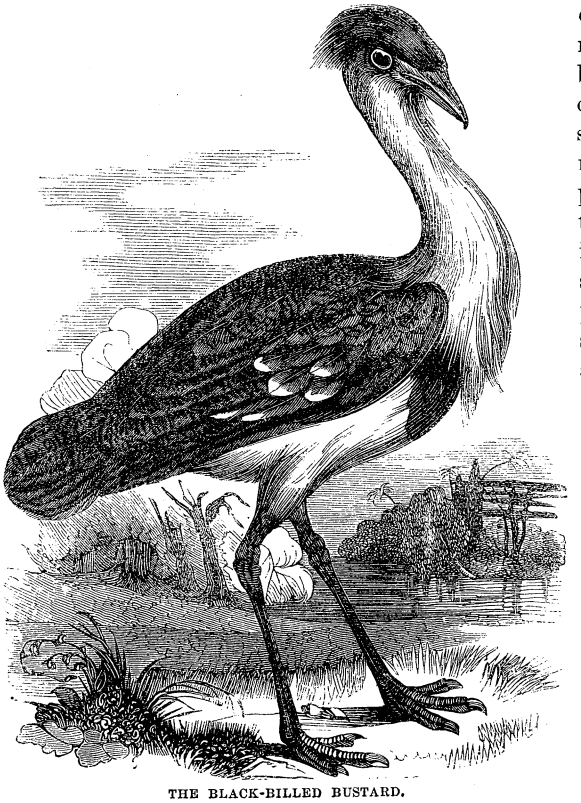
Genus ŒDICNEMUS: *Œdicnemus.*—This includes the Great Plover, *Œ. crepitans*—also called *Thick-Knee, Stone Curlew*, &c. It is seventeen inches long; pale brown above; brownish-white beneath; common in summer throughout Southern Europe; retires to Africa for the winter, and is found as far south as the Cape.

Genus GLAREOLA: *Glareola.*—This includes several species called *Pratincoles*, having a

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THE GREAT BUSTARD.



THE BLACK-BILLED BUSTARD.

slender form, long wings, and a certain swallow-like appearance. The COLLARED PRATINCOLE of Europe, *G. pratincola*—the *Sea Partridge* of the French—runs and flies with great swiftness, and feeds on aquatic insects, often taking them on the wing; found in the temperate parts of Europe, Asia, and Africa.

Genus CURSORIUS: *Cursorius*.—This includes the COURSERS, which are noted as running with great swiftness, and of which there are several species. The CREAM-COLORED COURSER, *C. Europæus*, is ten and a half inches long, and resembles the plovers in its habits; found in Middle Europe. It is sometimes called the *Cream-colored Plover*.

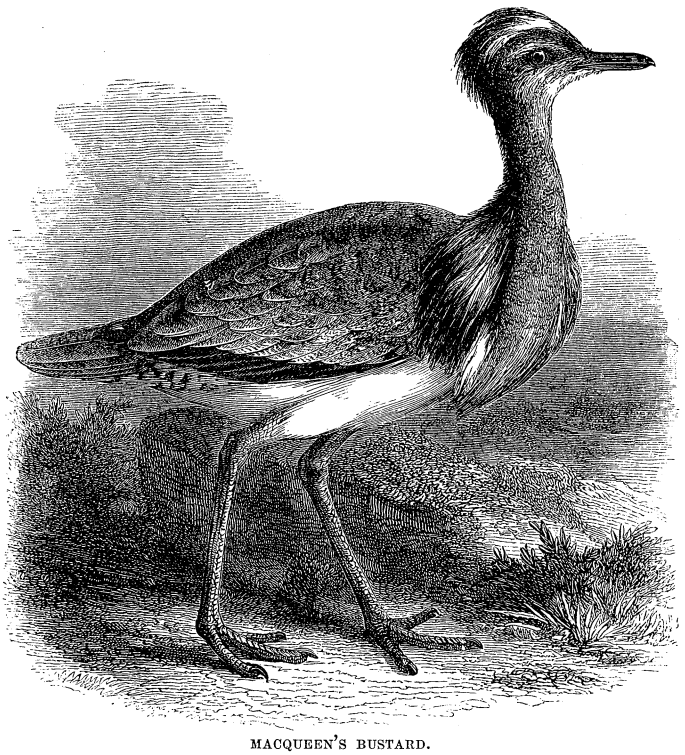
THE BUSTARDS.

These birds are generally of large size, and live upon heaths and dry plains, in various parts of the eastern hemisphere. They run rapidly and fly well, although they rise with difficulty. Their food consists principally of worms and insects, with a few reptiles, and even small mammalia, and birds. Green vegetables also appear to constitute a part of their diet. They are said to be polygamous, and the males take no part in incubation, but retreat to marshy places, while the females lay and hatch their eggs among tall herbage, frequently in corn-fields. During the breeding season the males are seen in fine days, displaying themselves like turkey-cocks, spreading their tails, drooping their wings, and dilating their throats.

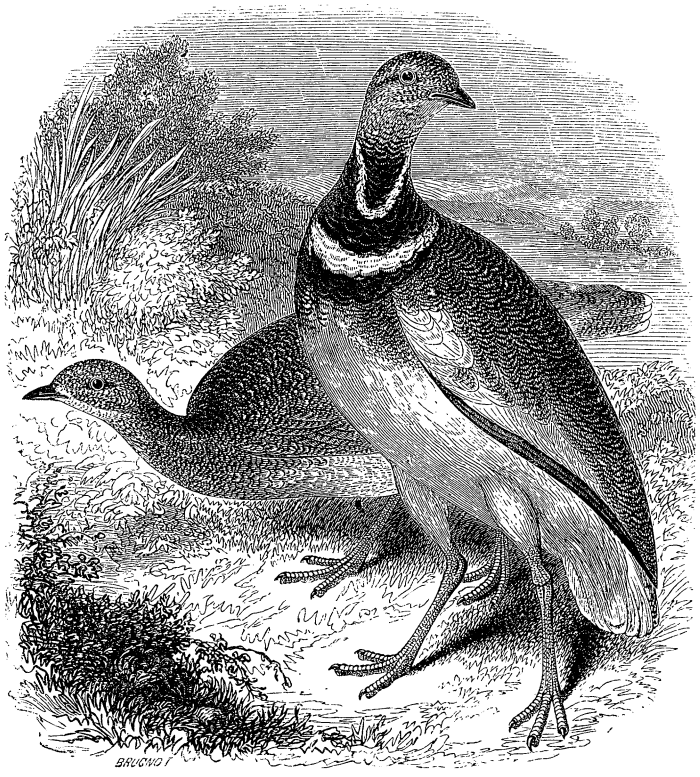
Genus OTIS: *Otis*.—This includes the GREAT BUSTARD, *O. tarda*, forty-five inches long; pale chestnut, barred with black above; beneath white. It feeds on green wheat, grapes, trefoil, and other vegetable substances. The nest is a depression in the bare ground; the eggs are two, and olive-brown; the flesh is excellent, and it is often seen in the markets of countries where it is found. It is common in Southern Europe, and was formerly abundant in some parts of England, but has become nearly extinct there.

MACQUEEN'S BUSTARD, *O. Macqueeni*,

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MACQUEEN'S BUSTARD.



THE LITTLE EUROPEAN BUSTARD.

inhabits the dry sandy plains of Afghanistan, where it is sometimes seen in flocks of five or six. It flies heavily and for short distances, soon alighting and running. Its flesh is exceedingly tender, and so covered with fat, that the skins are dried and preserved with great difficulty. It appears to stray widely from its home, as two specimens have been killed in England, and one or more in Denmark. In the crop of one of them were found caterpillars, snails, and beetles. This bird has a crest, and on the sides of the lower part of the neck, a series of long plumes; upper surface sandy-buff; beneath light gray.

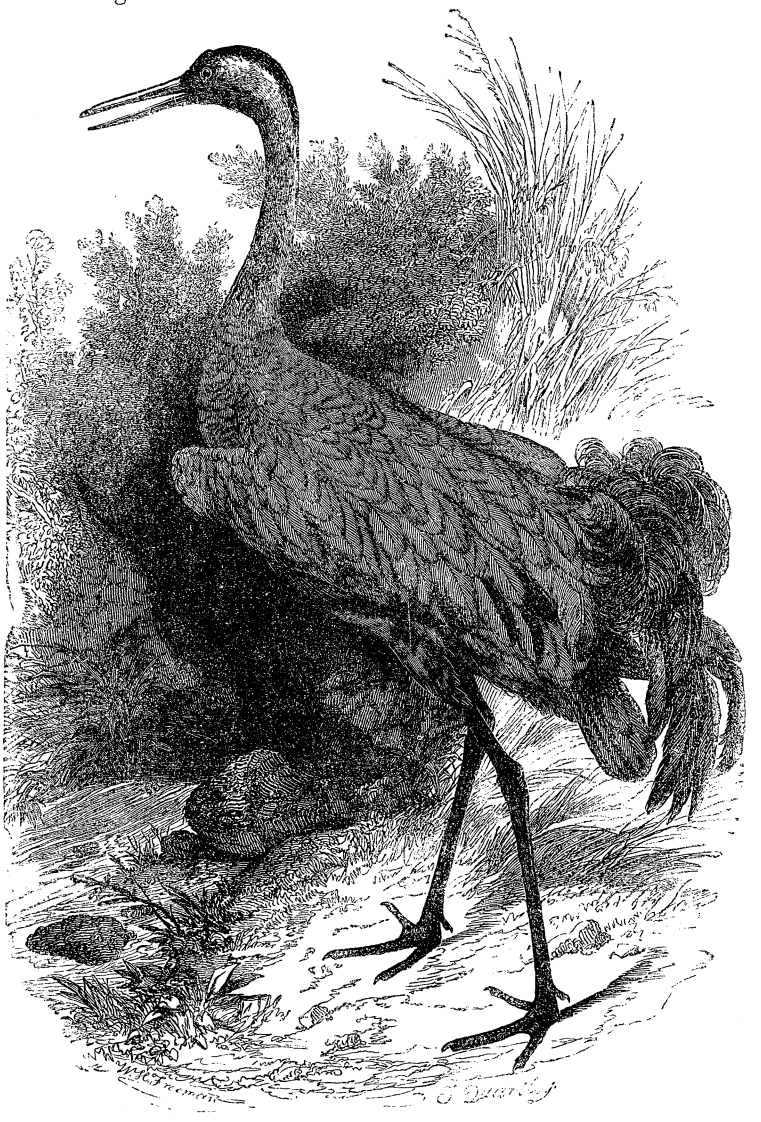
The Black-billed Bustard, *O. nigriceps*, is four and a half feet long; pale gray above and white beneath. It is found in various parts of India, and is very abundant in the Deccan —one Englishman having shot nearly a thousand there. It lives in large flocks, and is esteemed one of the greatest delicacies of the table.

The Blue Bustard, *O. cærulescens*, is a small African species, twenty inches long. Denham's Bustard, *O. Denhami*, is another African species, three feet nine inches long; found in Central Africa, and habitually associating with the gazelles. Burchell's Bustard, *O. Kori*, called the *Wilde Paauw* by the colonists, is found on the Orange River; stands five feet high. The flesh resembles that of the turkey. The Trotting Bustard, *O. houbara*, is a native of North Africa and Arabia.

The Little European Bustard, *O. tetrax*, is seventeen inches long; pale chestnut, streaked with black above;

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beneath white; habits similar to the preceding; common in Southern Europe; rare in the North; occasionally seen in England.

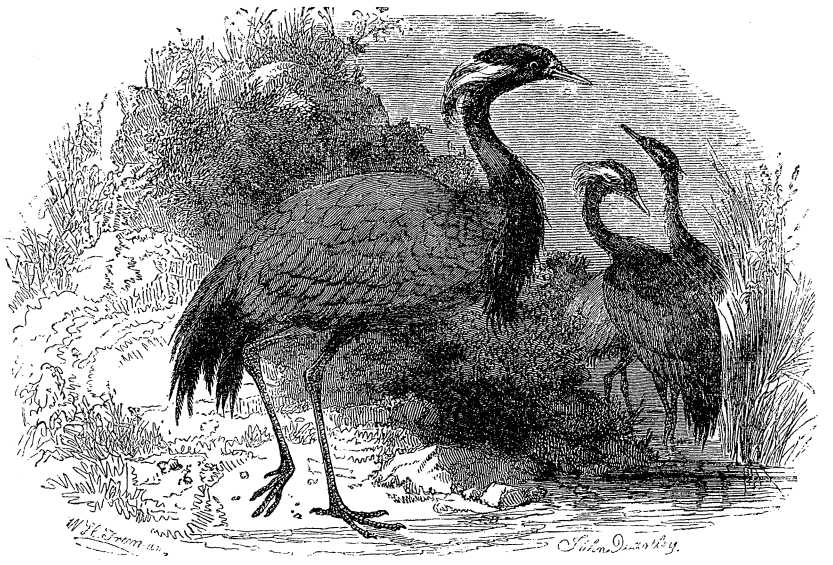


THE COMMON EUROPEAN CRANE.

THE GRUIDÆ OR CRANES.

These are large and stately birds, most of them living exclusively in warm climates. The food is various, comprising insects, reptiles, worms, and fish; some species likewise frequent plowed and newly-planted fields to pick up seeds, as well as living prey. They dwell in fields, marshes, and along the margins of ponds, but always roost in trees, where they also nest, as well as on the ground. When incubation commences, the nest is raised to the height of the body with grass and reeds; they are said to lay but two eggs, on which each alternately broods in a standing posture, the legs striding the nest. They migrate in vast flocks, and perform very extensive periodical journeys, passing along in the higher regions of the atmosphere; they often move in the night, and usually in troops arranged in long triangular lines, guided by the shrill voice of their leader, which, re-echoed by the timorous and unseen ranks, affords often the only indication of the

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THE NUMIDIAN CRANE.

course of their passage. Subject to less excitement, they pass along silently and at a great elevation in fine weather, but lower their flight, and become clamorous at the approach, or during the existence, of a storm. Milton, describing these migrations, says:

"Part loosely wing the region, part, more wise,
In common, ranged in figure ⊱ wedge their way,
Intelligent of seasons, and set forth
Their aery caravan, high over seas
Plying, and over lands with mutual wing,
Easing their flight; so steers the prudent Crane
Her annual voyage, borne on winds the air
Flotes, as they pass, fann'd with unnumber'd plumes.'

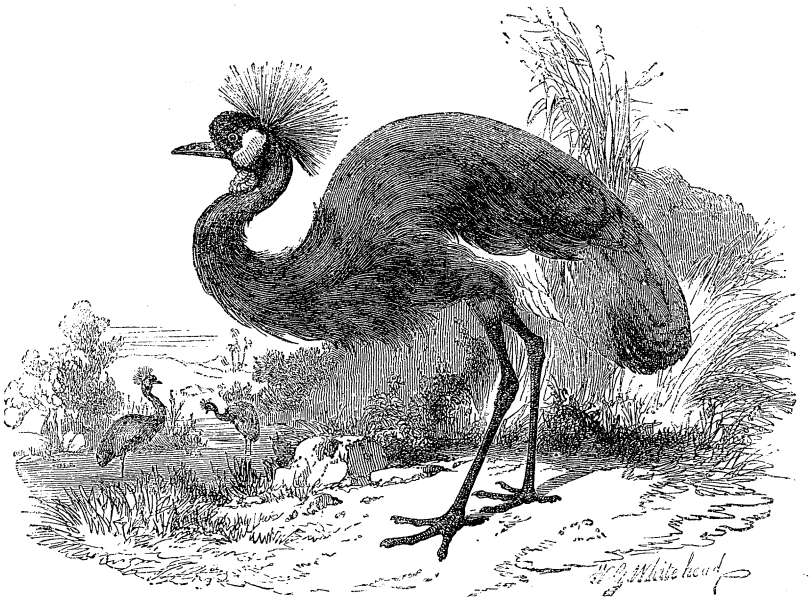
Genus GRUS: *Grus.*—The COMMON CRANE OF EUROPE, *G. cinerea*, is four feet long; bluish-ash above; beneath ash-gray. It migrates to the north of Europe and Siberia in spring, remains there and breeds in summer, and in the autumn returns to Africa and Southern Asia for the winter. It feeds on worms, insects, reptiles, mollusca, and sometimes on grain. Its nest is usually made among reeds and tall herbage, in the marshes which it frequents; it, however, occasionally builds on ruined edifices. In its migrations it flies, like wild geese and swans, in the form of a wedge, frequently uttering a loud cry.

The AMERICAN CRANE, *G. Americana*, is four feet six inches long; crested; color bluish-ash; feeds on crabs, shell-fish, eels, and various kinds of fruit. It is stationary from the Carolinas southward; in summer it migrates as far north as New Jersey. It is often called *Whooping Crane* on account of its wild, sonorous cry, which has been compared to the whoop of savages when rushing to battle. Nuttall says: "In February, and in the early part of the following month, I heard their clamorous cries nearly every morning around the enswamped ponds of West Florida, and throughout Georgia, so that many individuals probably pass either the winter or the whole year, in the southern extremity of the Union. It is impossible to describe the clamor of one of these roosting flocks, which they begin usually to utter about sunrise. Like the howling monkeys of South America, a single individual seemed at first as if haranguing, or calling out to the assembled company, and after uttering a round number of discordant, sonorous, and braying tones, the address seemed as if received with becoming applause, and was seconded with trumpeting hurrahs."

The SAND-HILL CRANE, *G. Canadensis*, is forty-eight inches long; color yellowish-gray; found from Mexico to the Arctic Sea. It is called the *Brown Crane* and also the *Canada Crane*. Cassin mentions a species in New Mexico, *G. fraterculus*.

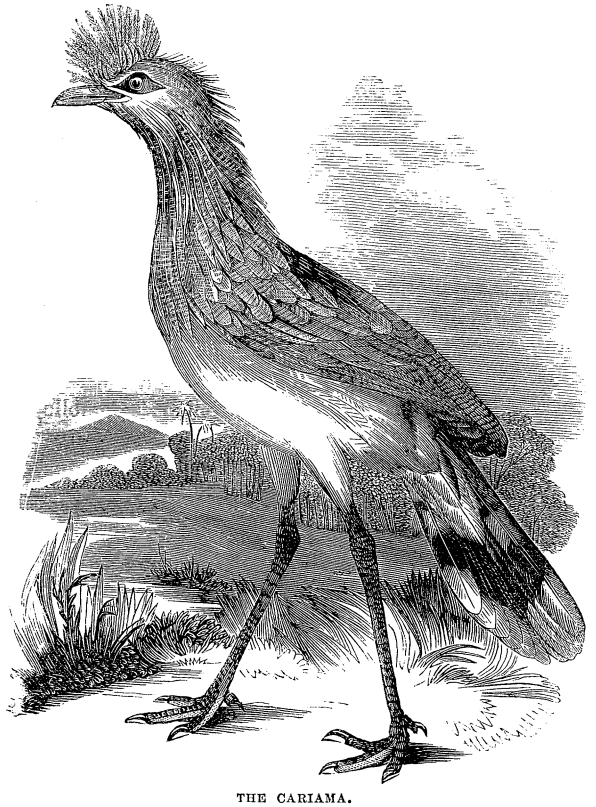
Genus ANTHROPOIDES: *Anthropoides.*—This includes the NUMIDIAN CRANE, *A. virgo*—called *Demoiselle* by the French—three feet long; general color slaty-gray; migratory; food, grain, seeds, small fishes, mollusca, and insects. Africa appears to be its home, but it is found in parts of Asia, and is occasionally seen in Southern Europe.

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THE BALEARIC CRANE.

Genus BALEARICA: *Balearica.*—This includes the CROWNED CRANE, *B. pavonina—Ardea pavonina* of Linnæus; also called the *Balearic Crane*, from the notion that it was the bird to which the ancients gave that name. It stands four feet high; its color is a bluish-slate; it has a loud, hoarse, trumpet-like note, is easily reconciled to captivity, and readily mingles with common poultry; found in Northern and Western Africa.



THE CARIAMA.

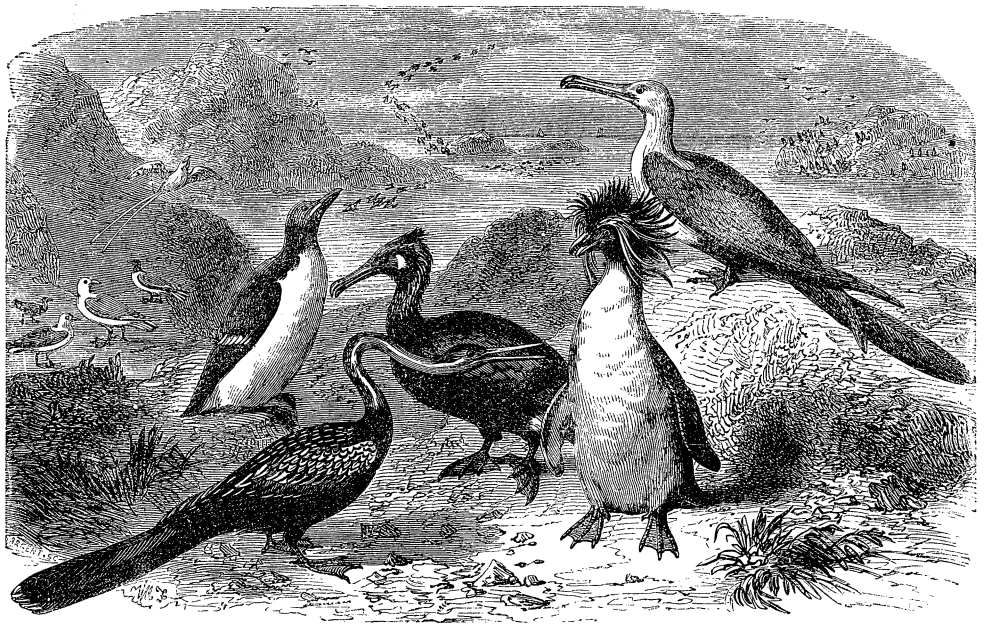
Genus PSOPHIA: *Psophia.*—To this belongs the TRUMPETER, called *Agami* by the natives of tropical America, in the forests of which it is found in flocks; it is twenty-two inches long, and has a loud, hollow cry of *too, too, too, too*, the sound being made without opening the bill.

Genus CARIAMA: *Cariama.*—To this belongs the CARIAMA, *C. cristatus*, found in the lofty plains of Brazil and Paraguay. It is thirty inches long; earthy-brown above, whitish below; it runs with great swiftness, and is exceedingly shy and watchful. It feeds on lizards, insects, and molluscous animals. It is easily domesticated, and will live sociably with the other tenants of the poultry-yard.

Genus ARAMUS: *Aramus.*—To this belongs the CRYING-BIRD, *A. scolopaceus*, two feet long, of a reddish-brown color; common in tropical America; found occasion-

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ally in Florida. It is sometimes called *Courlan* and also *Aramus*. It feeds on frogs and insects, lives alone or in couples, perches on elevated trees, and has a piercing cry of *carau*, *carau*, *carau*, which may be heard for half a mile.



GULLS, ETC. GUILLEMOT. SNAKE-BIRD. CORMORANT. CRESTED PENGUIN. FRIGATE-BIRD.

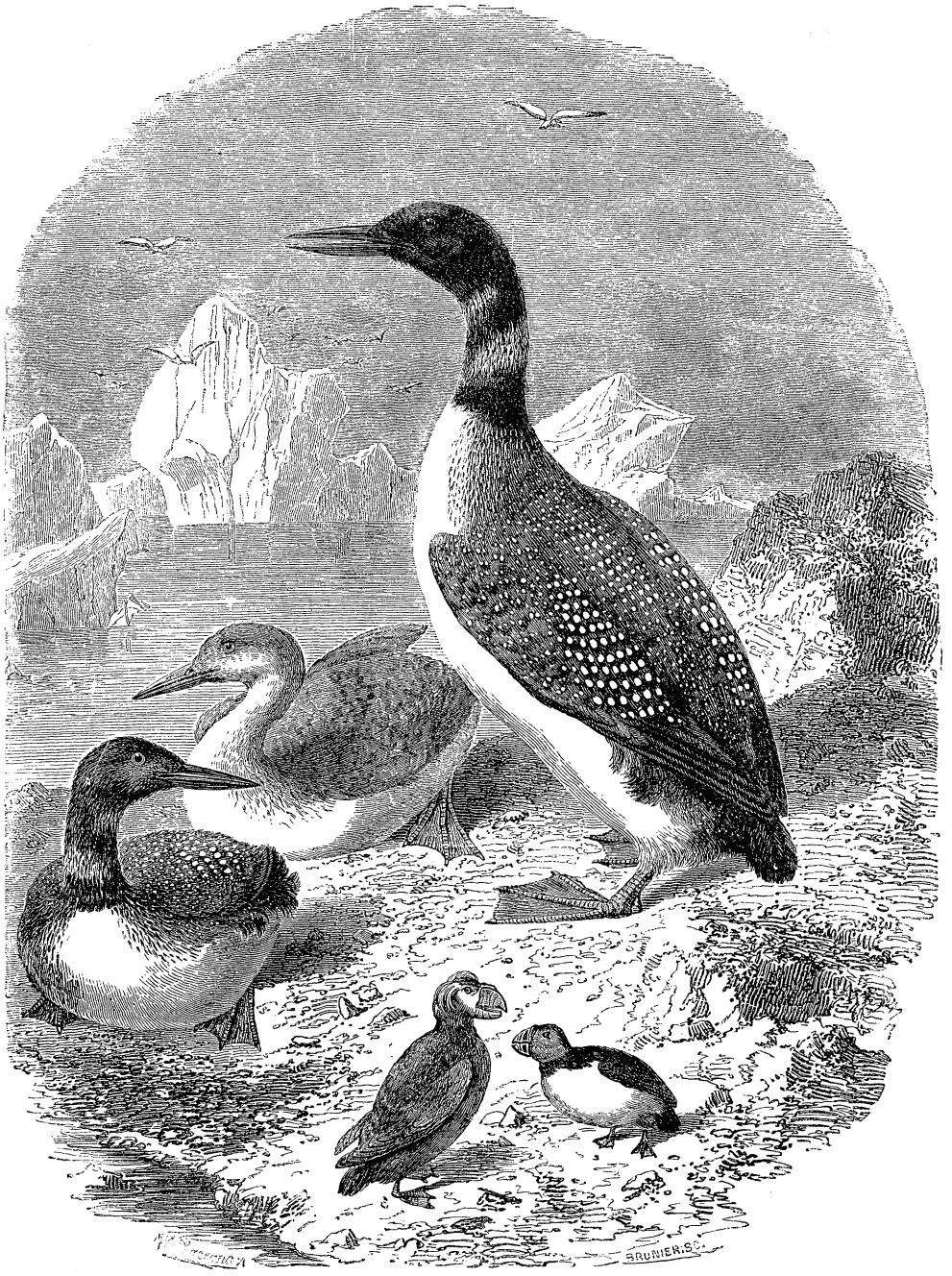
ORDER 8 **NATATORES.**

The most striking character of the *Natatores*, or *Swimming-Birds*, is derived from the structure of the feet, which are always palmate, that is, furnished with webs between the toes. There are always three toes directed forward, and these are usually united by a membrane to their extremities; but in some cases the membrane is deeply cleft, and the toes are occasionally quite free, and furnished with a distinct web on each side. The fourth toe is generally but little developed, and often entirely wanting; when present it is usually directed backward, and the membrane is sometimes continued to it along the side of the foot. These webbed feet are the principal agents by which the birds propel themselves through the water, upon the surface of which most of them pass a great portion of their time; and by the same means many species dive to a considerable distance below the surface in search of their food, which consists almost entirely of fish, mollusca, and other small aquatic animals. The feet are generally placed very far back, a position which is exceedingly favorable to their action in swimming and diving, but which renders their progression on the land somewhat awkward. In some instances the feet are situated quite at the hinder extremity of the body, which then assumes an upright position when on land.

The body is generally stout and heavy, and covered with a very thick, close, downy plumage, which the bird keeps constantly anointed with the greasy secretion of the caudal gland, so that it is completely waterproof. The wings exhibit a very great variety in their development. In the Penguins they are reduced to a rudimentary condition, destitute of quills, and covered with a scaly skin, forming flat, fin-like organs; while in some other species the wings are of vast size and power, and the birds pass a great part of their lives in the air. Between these two extremes we meet with every intermediate degree of development. Those species which are endowed with the greatest power of flight are usually incapable of diving, although they frequently take their prey by plunging suddenly into the water, from the air.

The form of the bill is also very variable: in some it is broad and flat, in others deep and com-

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HAUNTS OF SEA-FOWL—THE GREAT NORTHERN DIVER, GUILLEMOTS, PUFFINS, ETC.

pressed, and in others long and slender. The mandibles are sometimes sharp and smooth, sometimes furnished with denticulations or lamellæ at the margins. The texture of the bill also varies; but these differences will be referred to in characterizing the families.

Most of these birds live in societies, which are often exceedingly numerous, inhabiting high northern and southern latitudes. Many of them prefer rocky coasts, in the clefts and crannies of which they lay their eggs, often on the bare rock, but generally selecting the most inaccessible

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situations. The nest is always of a very rude description; but some species have the instinct to attach their nests to aquatic plants in such a manner that, although it is securely anchored to one spot, it is capable of rising or falling, in accordance with any change that may take place in the level of the water.

The immense number of birds that live on the water, and are hence called *Water-fowl*, absolutely baffles human comprehension. Not only the rivers and lakes—especially those remote from the abodes of man—teem with them, but the boundless shores of the ocean are peopled with multitudes which no man can number. On numerous islands they have heaped up mountains of Guano,* which are now taken from their native beds and distributed over Europe and America. As affording a vivid idea of the immense collections of sea-fowl on the rocky borders of the ocean, we copy the following description† of Ailsa Craig, an island on the west of Scotland:

"It was a naked rock, rising nine hundred and eighty feet abruptly out of the sea. A little level space projected on one side, with a small house on it. We could not conjecture the use of a habitation there. The captain of the steamer said it was the *Governor's* house. We asked him what a governor could do there. 'Take care of the birds,' he replied; 'and he pays the Marquis of Ailsa, the proprietor, who takes his title from the Craig, fifty pounds rent for the privilege of taking them.' 'What sort of birds?' we asked him. 'Sea-fowl of all sorts,' he said. 'They inhabit the Craig, and ye'll may be see numbers of them. They are quite numerous. The marquis has threatened prosecution if people fire upon the Craig from the vessels. They have been in the habit of firing to alarm the birds, to see them fly.' He had been himself governor of the Craig, he said, some years before, and had great sport and some danger in killing the birds. His way of killing them was with a club, and he told us how many thousand—we dare not say how many—he had killed in a single day of a famous kind of goose. He had let himself down to a quarter of the cliffs where they haunted, to get the young and eggs, and the old ones attacked him, and he fought them with his club till he was covered with blood—theirs and his own. He had a good mind, he said, to give them one gun, just to let us see them fly, as we were strangers. As he had been the marquis's governor, he said, he would venture that he would overlook it in him. He ordered his boy to bring the musket. The boy returned and said it was left behind at Glasgow. 'Load up the swivel, then,' said the captain; 'it will be all the better. It will make quite a flight, ye'll find. Load her up pretty well.'

"The steamer meanwhile kept nearing the giant Craig, which was a bare rock from summit to the sea, and all of a dull, chalky whiteness, occasioned as the captain said, by the excrement of the birds. We saw caves in the sides of the mountain, and down by the water; the retreats, our informant told us, in former times, of the smugglers, who used to frequent the Craig, and carry on an extensive trade from these places of concealment. We had got so near as to see the white birds flitting across the black entrances of the caverns, like bees about the hive. With the spy-glass we could see them distinctly, and in very considerable numbers, and at length approached so that we could see them on the ledges all over the sides of the mountain. We had passed the skirt of the Craig, and were within a half mile, or less, of its base. With the glass we could now see the entire mountain side peopled with the sea-fowl, and could hear their whimpering, household cry, as they moved about, or nestled in domestic snugness on the ten thousand ledges. The air, too, about the precipices seemed to be alive with them. Still we had not the slightest conception of their frightful multitude. We got about against the center of the mountain, when the swivel was fired. The shot went point-blank against it, and struck the tremendous precipice as

* The beds of GUANO, found in various places, consisting of the excrement, bones, and feathers of sea-fowl, afford evidence of the enormous quantities of birds collected in these haunts. On the *Lobos* or *Chincha Islands*, in the Pacific, fourteen miles west of Peru, the beds are more than a hundred feet thick, and although numerous vessels are constantly employed in transporting it to Europe and America, to be used for manure, it is supposed that the deposit will last for a hundred years. The fertilizing properties of this were known to the ancient Peruvians, and it was extensively used by them in their agriculture. It was long neglected by the Spanish Peruvians, but their attention has been lately turned to it, and now it is one of the chief sources of revenue to the state. It is estimated that the whole value of the deposit is five hundred millions of dollars! No doubt the accumulation has been going on for thousands of years; but still, its almost incalculable magnitude shows that myriads of birds must have contributed to such a result.

† By Nathaniel P. Rodgers.

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from top to bottom, with a reverberation like the discharge of a hundred cannon. And what a sight followed! They rose up from that mountain—the countless myriads and millions of sea-birds—in a universal, overwhelming cloud that covered the whole heavens, and their cry was like the cry of an alarmed nation. Up they went—millions upon millions—ascending like the smoke of a furnace—countless as the sands on the sea-shore—awful, dreadful for multitude, as if the whole mountain were dissolving into life and light, and with an unearthly kind of lament, took up their line of march in every direction off to sea! The sight startled the people on board the steamer, who had often witnessed it before, and for some minutes there ensued a general silence. For our own part, we were quite amazed and overawed at the spectacle. We had seen nothing like it ever before. We had seen White Mountain Notches and Niagara Falls, in our own land, and the vastness of the wide and deep ocean, which was then separating us from it. We had seen something of art's magnificence in the old world, 'its cloud-capt towers, its gorgeous palaces and solemn temples;' but we had never witnessed sublimity to be compared to that rising of sea-birds from Ailsa Craig. They were of countless varieties, in kind and size, from the largest goose to the smallest marsh-bird—and of every conceivable variety of dismal note. Off they moved, in wild and alarmed rout, like a people going into exile—filling the air, far and wide, with their reproachful lament at the wanton cruelty that had broken them up and driven them into captivity. We really felt remorse at it, and the thought might have occurred to us, how easy it would have been for them, if they had known that the little smoking speck that was laboring along the sea-surface beneath them, had been the cause of their banishment, to have settled down upon it and ingulfed it out of sight forever.

"We felt astonished that we had never before heard of this wonderful haunt of sea-fowl, and that no one had ever *written a book upon it.* It struck us as really one of 'the wonders of the world.' And not us alone; others, not at all given to the marvelous, declared that it surpassed every thing they had ever before witnessed. We supposed the mountain must have been quite deserted, from the myriads that had flown away; but lifting the glass to it, as we were leaving its border, we were appalled to find it still alive with the myriads left behind. They kept leaving and leaving, until our steamer had got far on beyond the Craig, and till we could no longer discern their departure with the telescope; and it was miles off into the dusky Irish Sea, before we saw the ebbing of their mighty movement, and that they were beginning to return. We felt relieved to see them going back. It had scarcely occurred to us, in our surprise, that they were not leaving their native cliffs forever. Slowly and sadly they seemed to return, while the eye sought in vain to ken the outskirts of their mighty caravan. And Ailsa Craig had sunk far into our rear, and quite sensibly diminished in the distance, before the rearmost of the feathered host had disappeared from our sight."

And this is but one of hundreds, nay, of thousands, of rocky recesses along the interminable boundaries of the ocean, filled with myriads of sea-fowl. Numerous islands among the Hebrides; others to the north—the Shetlands and Orkneys; the high beetling cliffs of North America, from Nova Scotia to Greenland; the southern coasts of Africa; the bleak dizzy craigs around Cape Horn; the lofty cliffs that hang frowning over the sea on either side of Behring's Straits—breasting the shock of the Pacific that has sundered, and still sunders the two continents; these, and a multitude of other wild rocky ledges, are, like Ailsa rock, the abodes of millions upon millions of sea-fowl: geese of many kinds, ducks, guillemots, grebes, divers, puffins, sheer-waters, terns, gulls, petrels, cormorants, frigate-birds and pelicans. And beside all this, there is no part of the ocean, however distant from the land, where some species are not found; in many places, especially in high northern latitudes, the face of the waters is covered with them. What is loneliness and desolation to man, is peace and abundance to them. Often in crossing the cold and tumultuous waters that roll to the north and east of the Grand Banks, have we seen whole troops of sea-fowl, tossing on the sea, yet screaming with delight, and seeming to overflow with enjoyment.*

* Nor are the swimming birds the only ones that traverse the great waters. A graphic writer has furnished us with a sketch of the *Visitants of Ships at Sea*, which is too amusing and too instructive to be omitted. We therefore give it in a note:

"All persons who have made long voyages, especially in land-locked seas and on board of sailing-vessels, must

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The natatorial birds are divided into six families: the ANATIDÆ, including the *Flamingoes*, *Swans*, *Geese*, *Ducks*, &c.; the COLYMBIDÆ, including the *Grebes*, *Divers*, *Guillemots*, &c.; the ALCADÆ, including the *Penguins*, *Auks*, *Puffins*, &c.; the PELICANIDÆ, including *Pelicans*, *Cormorants*, *Frigate-Birds*, *Gannets*, *Darters*, *Tropic-Birds*, &c.; the LARIDÆ or *Gulls;* and the PROCELLARIDÆ, including the *Albatross*, *Fulmars*, *Petrels*, &c.

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remember, painfully, the wearisomeness of protracted calms. But travelers who have a turn for natural history, often find amusement in circumstances which kill others with ennui. At particular seasons of the year, a ship has no sooner been two or three days out at sea, than the passengers observe birds of various kinds perched upon the rigging. Fatigue is generally supposed to be the cause of these visits, though we cannot always have recourse to this explanation, since even when the shore is near at hand, these little explorers of strange things will come and display their beauty to the mariner, reminding him of green woods and sunny glades, in the midst of vast billows and the watery deep.

"We believe that hawks and falcons are not usually reckoned among migratory birds; yet it is certain that they sometimes cross the Mediterranean where it is broadest, as well from Africa to Europe as from Europe to Africa. One day in summer, lying almost midway between Marmorice and Greece, we observed a golden falcon coming up swiftly from the south, and resting upon the top-gallant-sail-yard. As he remained there a considerable time, we inferred that he meant to make the passage to Europe in our company; and a young sailor went up to do the honors of the ship, and invite him to descend. Having evidently had enough of flying, the falcon made no objection. He suffered himself to be taken without the least resistance; and when brought down to the deck looked about him, as we thought, with tokens of pleasure. Perhaps he detected the smell of meat; and certainly when some was offered to him, the voracity with which he fell upon it suggested the probability that we were indebted for the pleasure of his company to hunger rather than weariness.

"Being treated with much kindness, he showed no desire to quit us, though allowed his full freedom. He flew fore and aft, soared up to the vane, and then, when he thought proper, came down like an arrow.

"Every body on board was amused with him, and loved to gaze at his large, bright, piercing eyes as he watched every thing around him, or turned up quick glances at the clouds. We began to think him as tame as a kitten, and gave him, by way of peace-offering, bits of meat with our fingers, and some of the bolder among us even ventured to stroke his speckled breast. This, however, was not done without some apprehension, for he had sharp claws, and his beak was formidable.

"When he had already been with us eight or ten days, we came in sight of Etna, towering ten thousand feet into the blue firmament, and with its deep snowy cap, looking like a stationary cloud. The falcon no doubt saw it much sooner than we did; but he had been kindly treated, and was doubtless loath to break hospitable ties. But when liberty or servitude was the question, he could not long hesitate; and after wheeling twice or thrice about the ship, as if to take an affectionate leave of us, he rose aloft; plunged into space, and disappeared in the direction of the great mountain. We could not blame him, though, as he had grown friendly and familiar, we much regretted his departure.

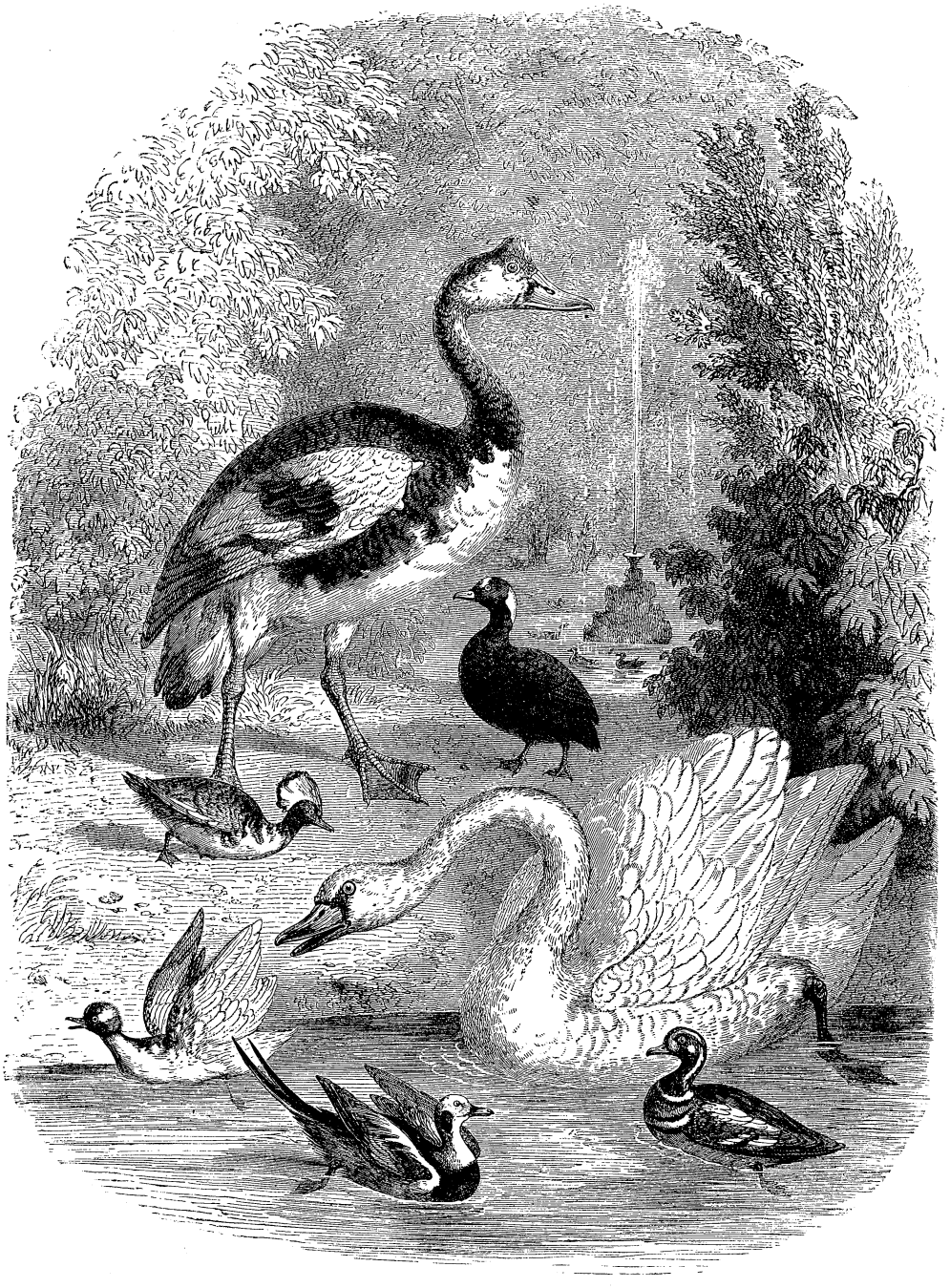
"Some of the old Dutch navigators being, like the rest of their countrymen, possessed strongly by the love of gardening, often used to make the attempt to indulge in the pleasures of horticulture on board ship. They made large, long, and deep boxes, filled them with fine earth, and raised for themselves cresses and other salads during their voyages to the east. When the keen-eyed birds perceived, as they could from a great distance, these little floating patches of verdure, they often alighted on the vessels to examine them. But most of the visits paid to ships by birds are owing to precisely the same motive as makes wayfarers pause at an inn on the road—they have traveled far, and need a little repose.

"Unfortunately, sailors have formed a strange theory respecting the appearance of birds in the neighborhood of their vessels, on their sails, or among the rigging. They look upon them as the sure forerunner of storms. Even the most observant travelers are sometimes betrayed, by putting confidence in seafaring men, usually full of prejudice and superstition, into sharing this belief. An able naturalist, sailing out of the Baltic, observed, just before losing sight of the island of Gothland, a small gray bird of the sparrow tribe, following the ship, upon which the captain said they should certainly have bad weather. Accordingly, in less than half an hour the wind rose, the sea ran high, and the waves broke fiercely over the bulwarks. The same writer remarks that in the North Sea, the Baltic, and on the coast of Spain, whenever birds came on board, a tempest was sure to follow, which led him to infer that the petrel is not the only bird whose visits portend storms.

"Navigators in the Indian Ocean sometimes observe upon the yards and rigging of their ships, unknown birds of the richest plumage, which come to them when they are so far out at sea that nothing but experience could prove the possibility of a bird's flying to so great a distance. There are two species of cuckoo, natives, it is said, of Hawaii, which are known to fly across the ocean all the way from Australia to New Zealand, a distance of a thousand miles, without once resting, because there is no land between on which they could alight. As swift birds, however, fly at the rate of one hundred and fifty miles an hour, they can perform this formidable passage in less than five hours and a half.

"An eastern mariner once related to us a curious anecdote of a bird-visitor which he had many years before on board his ship. Having left the vicinity of Danger Island, he sailed along almost due east for upward of a thousand miles, when, early one morning, he observed among the cordage, a bird in shape like a swallow, but of the most exquisite and delicate colors; its breast was bright azure, its tail green, its wings scarlet; from its head rose a golden crest, and its eyes were surrounded by a circle of pink feathers. It had been subdued, no doubt, by means of hunger, to a temper of the greatest tameness. He held out to it a little rice upon a plate. The bird descended, perched upon his arm, and ate with extreme voracity. It was evidently much used to man, took fright at no one, but at dinner walked coolly about upon the cabin-table among the plates and dishes, now taking a bit from one hand, and

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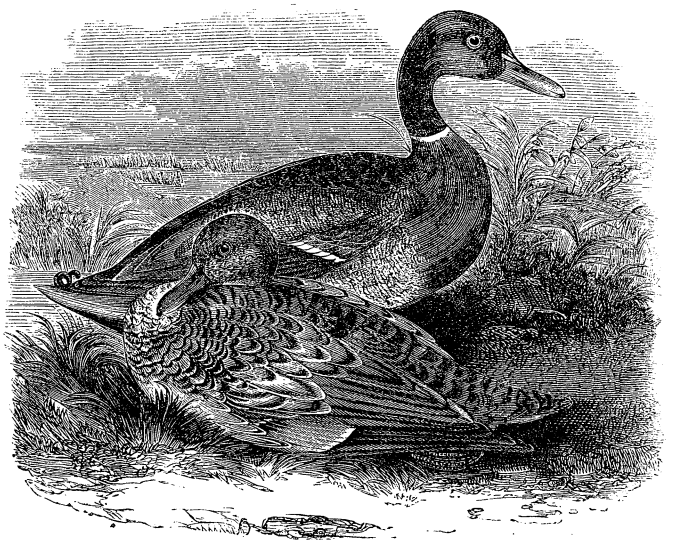
GROUP OF WATER-FOWL.

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THE ANATIDÆ.

This family includes a very large number of important and interesting birds, of which the *Duck* is the type. The distinguishing characteristic is the bill, which is usually of a flattened form, covered with a soft skin, and furnished at the edges with a series of lamellæ, which serve to sift or strain the mud in which they generally seek their food. The feet are furnished with four toes, three of which are directed forward, and united by a web; the fourth is directed backward, usually of small size, and quite free. They are admirable swimmers, and live and move on the water with the utmost security, ease, and grace. Such is their adaptation to water, that the young birds, immediately after being hatched, will run to it and fearlessly launch themselves upon its bosom, rowing themselves along with their webbed feet, without a single lesson, and yet as dexterously as the most experienced boatman. This order includes not only the *Ducks*, of which there are many kinds, but *Geese*, *Swans*, *Flamingoes*, &c. These are generally inhabitants of the fresh waters, and, for the most part, prefer ponds and shallow lakes, in which they can investigate the bottom with their peculiar bills, without actually diving beneath the surface; yet at some seasons they are found along the borders of the sea. Their food generally consists of worms, mollusca, and aquatic insects, which they separate from the mud by the agency of the lamellæ at the margins of the bill; but most of them also feed upon seeds, fruits,



THE MALLARD.

now from another. Happening by chance to approach the cabin-door noiselessly, when, as he thought, the bird supposed itself to be alone, he heard it singing in the most plaintive manner, and at intervals talking in an unknown language. Watching it more narrowly, he observed that it was standing before a looking-glass, and holding a tender colloquy with its own image. On his entering, it seemed ashamed, and flew to the other side of the cabin.

"At length the ship arrived at a small island, where, during its stay, several chiefs came on board, and were invited into the cabin. The mariner was surprised to behold them fall on their knees, bow their heads, and mutter a prayer to this bird. Upon inquiry, the mariner found it was their god, who, having gone out upon the ocean for an airing, had lost his way, and owed his preservation to the fortunate accident of meeting with a ship. The chiefs offered a large sum of money for his ransom; but the generous mariner, respecting their prejudices, or else pitying their weakness, restored them their divinity, without even charging for his board and lodging

"In Europe—though the plumage of the birds be less brilliant, which may account, perhaps, for their being held in less respect—ships sometimes present the appearance of a moving aviary. A vessel sailing through the Bay of Biscay, a considerable distance from land, became the resting-place of a goldfinch and chaffinch; snipes, also, and a white owl, flew round the ship; and, what was more surprising, a hawk appeared in the midst of large numbers of swallows and martins. To explain this phenomenon, we must suppose that the migratory instinct subdues for a season the instinct of ferocity, otherwise the white owl and the hawk would have feasted forthwith upon their companions. Finding themselves to be fellow-travelers with smaller and more defenseless birds, and looking upon the ship as a wandering caravansary, they respected the rites of hospitality, and for several days lived among their inferiors with equal gentleness and condescension. Another visitant to the same ship was a hen redstart, which entered through the port-holes over the guns, and was daily fed by the sailors. Having reposed as long as was needful, these little wayfarers took their leave—we may presume on their way to Africa, since the ship seems to have been descending from a higher to a lower latitude, and thus afforded the emigrants a welcome lift. On board the same vessel a small gallinule and a kestrel hawk were caught at a distance of four hundred and twenty-four miles from land.

"It is highly probable that, if our naval officers were in general fonder of natural history, we should obtain from them extremely curious particulars respecting the habits of migratory birds. The oldest of the Greek poets alludes, in many parts of his poems, to the migration of cranes, which are so strong of wing that it may be presumed they

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and other vegetable substances. The migrations of these, as well as many other birds, have alike excited the admiration of the philosopher and the poet. Bryant expresses the thoughts they suggest in the following beautiful stanzas:

"Whither, 'midst falling dew,
While glow the heavens with the last steps of day,
Far, through their rosy depths, dost thou pursue
Thy solitary way?

"Vainly the fowler's eye
Might mark thy distant flight to do thee wrong,
As, darkly painted on the crimson sky,
Thy figure floats along.

"Seekest thou the plashy brink
Of weedy lake, or marge of river wide,
Or where the rocking billows rise and sink
On the chafed ocean-side?

"There is a Power whose care
Teaches thy way along the pathless coast,
The desert and illimitable air—
Lone wandering, but not lost.

"All day thy wings have fanned,
At that far height, the cold, thin atmosphere,
Yet stoop not, weary, to the welcome land,
Though the dark night is near.

"And soon that toil shall end,
Soon shalt thou find a summer-home, and rest
And scream among thy fellows; reeds shall bend
Soon o'er thy sheltered nest.

"Thou'rt gone—the abyss of heaven
Hath swallowed up thy form; yet on my heart
Deeply hath sunk the lesson thou hast given,
And shall not soon depart.

"He who, from zone to zone,
Guides through the boundless sky thy certain flight,
In the long way that I must tread alone,
Will lead my steps aright."

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never have reason to alight for rest on ships. After having passed the winter amid the warm marshes of the White Nile, or those of the Tigris and Euphrates, they traverse the scented valleys of Syria, and move in spring along the picturesque shores of Asia Minor. A learned traveler has an extremely interesting passage on their migration northward. A company of cranes, returning from their winter-quarters, flew in orderly array over Smyrna, on the 9th of March, northward. Another soon followed, and then many; some by day, when they were seen changing their figure and leader; some by moonlight, when they were heard, high in air, repeating their noisy signals. The same writer, sailing in autumn southward from the Hellespont, again saw his old friends on their way to their winter-quarters. Being near Tenedos, he says he was amused by vast caravans or companies of cranes passing high in the air from Thrace, to winter, as he supposed, in Egypt. He admired the number and array of their squadrons, their extent, orderly appearance, and apparently good discipline.

"Other migratory birds of strong wing scorn the aid of man in their flight, and dart from one continent to another, depending exclusively on the force of their own pinions. Thus the pelicans, though birds of great weight, ascend into the atmosphere, and forming themselves into one compact wedge, cleave the air like an arrow, and traverse the whole Mediterranean at one flight. They present a sight of rare beauty when preparing for their departure. Differing in this from many other birds, they commence their journey in the morning, collecting in myriads on the marshes of the Nile, and soaring aloft with a scream, they form a vast canopy overhead, while the sun, playing on their white feathers, delicately tipped with pink, reminds the traveler of the snows of the higher Alps, which are often rendered rosy by the touch of dawn.

"These powerful birds, as we have said, need no other resting-places in their migrations than such as have been supplied them by nature. It is otherwise with the smaller winged tribes. These, when caught by the foremast blast of high winds, in their attempt to cross the sea, invariably take refuge in ships. A Swedish naturalist, entering the Mediterranean early in the morning, observed that the *motacilla hispanica*—a beautiful species of wagtail—almost immediately came on board. It had become conscious of the approach of a storm, and endeavored to escape from it by flight. Observing beneath it the white sail of a vessel, while Africa was a long way off, it descended boldly, to make friends, and demand hospitality of the Swedish mariners. They seem, however, to have thought more of the high winds, which the arrival of these little pilgrims portended, than of the beauty or habits of their visitors. The wind which brought these aerial voyagers was a strong northeaster, and it came accompanied by thunder and lightning, things little familiar to Scandinavians, in the month of October. But it being the migratory season, the birds would not defer their journey on account of stress of weather; but mounting amid atmospheric and electric currents, undismayed by the thunder's roar or the lightning's flash, they sought to fulfill faithfully the behests of nature. In the morning, however, the waves were covered with the bodies of larks and wagtails, which had been killed by the fury of the elements during the night. Two only of these species reached the ship in safety.

"Sometimes birds seem to be induced by mere curiosity or love of mankind, to put out from their native shore and alight on ships at sea. The sparrow, it is well known, has an inveterate fondness for hopping and chirping about human beings, whether on land or water. It will even cling to the dwellings, long after the dwellers therein have passed away, and sit sadly on the eaves at dawn, as if expecting the appearance of some new inhabitant. We are not at all surprised, therefore, to find the African sparrow, on beholding a vessel, flying out to it, in order to take a crumb with its inmates. Sicily abounds with sparrows, which, during winter, sun themselves in large troops upon the beautiful old ruins of Grecian temples, where they will go round with you, as if they were quite interested in the antiquities. As soon as they see a ship, they fly away to it in great multitudes, as if delighted to examine any thing new; and on reaching it, flit about the sails, perch upon the yards, masts, and rigging, descending frequently to share the meals of the sailors, in whose rough humanity they place the most complete confidence.

"Many species of birds love to construct what Shakspeare calls 'procreant cradles' on the islands of the Mediterranean. Ægina is a favorite spot, where, but for the policy of the inhabitants, they would multiply so as fast to produce a famine. Accordingly, as soon as the breeding season sets in, the worthy natives disperse themselves over the island, peer into every nook and cranny of the rocks, in search of the nests of doves, pigeons, and partridges,

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THE FLAMINGO, SWANS, ETC.

Genus PHŒNICOPTERUS: *Phœnicopterus.*—This includes the *Flamingoes*, remarkable for their long legs, long neck, and large and powerful mandibles, bent downward from the middle. They have frequently been grouped with the Grallatores, but in their habits and mode of life they approach more nearly to the Natatores. They live upon the sea-shore, where they feed upon mollusca, crustacea, and young fishes, for which they dabble about in the mud and sand with their broad bills, in exactly the same manner as a duck, and when thus employed the object of the peculiar conformation of the bill is plainly seen. When the neck is turned downward to reach the ground in the most natural position, the bent apical portion of the upper mandible is necessarily directed downward; this, then, takes the place of the lower mandible in the duck, and serves to scoop and feel about in the mud. The tongue also assists wonderfully in the process of straining the muddy water, and retaining the food; it is furnished with numerous spines on its surface, and these are pressed by the mere weight of the tongue against the lamellæ of the upper mandible when the animal is feeding with its head in this reversed position. They are very gregarious birds in their habits, collecting into large troops in the marshes, where they follow the rise and fall of the tide in their search for food, so that they are often seen extending in single file over a considerable space.

The COMMON FLAMINGO of Europe, *P. antiquorum*, stands about five feet in height, and is of a fine rose-color, with bright red wings; when several are seen in line they appear like a regiment of British soldiers. While the community is engaged in seeking the means of subsistence, certain of its members are employed in the capacity of sentinels, to give notice of the approach of danger; this is done by a loud cry, like the sound of a trumpet, on hearing which the whole will take wing and escape to some place of greater security. They also migrate in large flocks, flying in an angular line, like that formed by geese and swans in their migrations. They make a most singular nest of mud, in the shape of a hillock, with a cavity at the top; in this they lay two or three white eggs, and then sit astride upon the top with one leg on each side. The young are able to run within a few days after their exclusion from the egg. This species is found in the south of Europe, especially in Sicily, Calabria, and Sardinia, but it is more abundant in the warm regions of Africa and Asia. They are exceedingly beautiful birds, their plumage being of the most delicate character, and their flesh is said to be equally good. Flamingoes were among the objects of the extravagance of the Roman epicures, and a dish of the tongues of these birds was regarded as a great delicacy.

The AMERICAN FLAMINGO—*P. Chilensis* of Molina—*P. ruber* of Wilson—is of nearly the same size and habits as the preceding, with which, in fact, it is confounded by many naturalists. It is found on the Pacific as well as the Atlantic coasts of tropical America; also in the West Indies, and on the border of Florida. A smaller species, *P. minor*, is said to exist in South Africa.

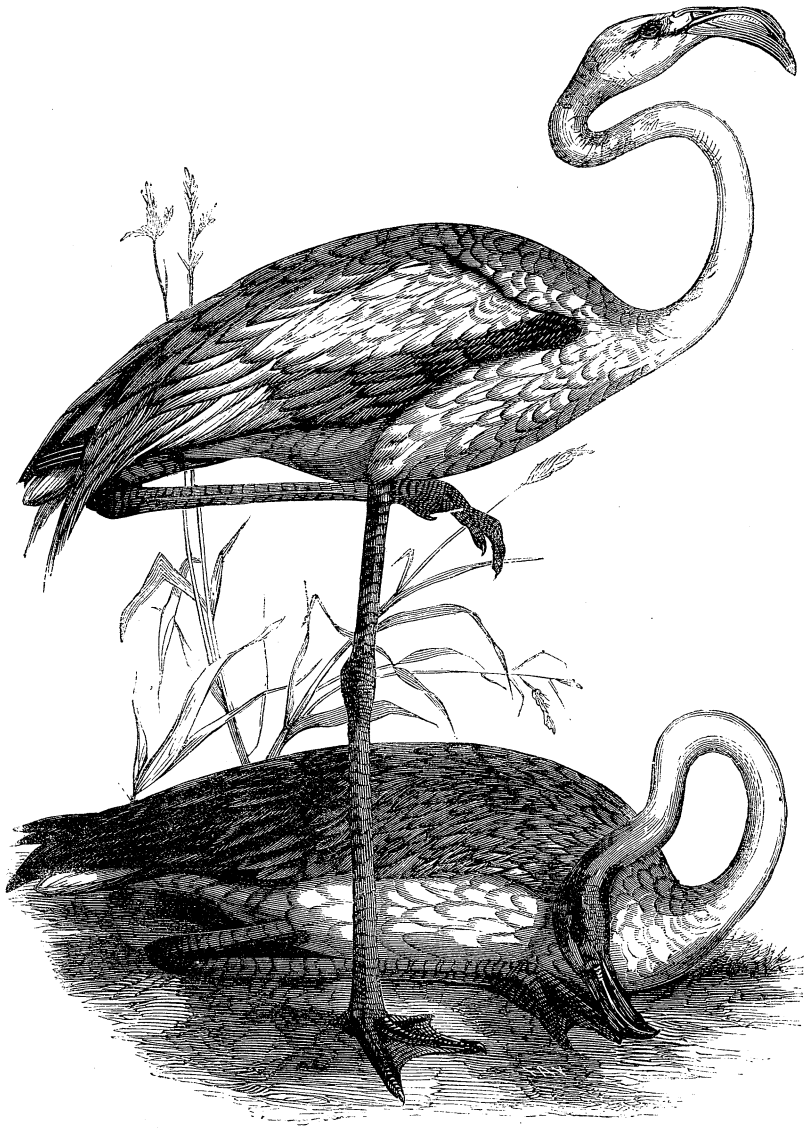
Genus CYGNUS: *Cygnus.*—This includes the *Swans*, of which there are several species, and which are among the most graceful of birds; few objects in nature are more beautiful than a

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whose eggs they collect and take away, or destroy on the spot without mercy. In this part of Greece the partridge is reckoned among singing birds. Its note, they say, is extremely sweet; and contrary to the instincts of its kind, at least as observed elsewhere, it perches at night. Now and then the solitary thrush—a peculiar species—alights on the barks that ply among the Cyclades. The Turks set a high value upon this bird, whose song is unrivaled save by that of the nightingale.

"It has been suggested by an able naturalist, that a most interesting Fauna might be written on the visitors of ships at sea; and the waters of our own coast would supply considerable materials for such a work. If sailors could be induced to apply their leisure hours to the study of natural history, they would be able to furnish the world with innumerable curious particulars respecting the habits of birds. Perhaps the most interesting scene for such observations is the Mediterranean, because of the vernal and autumnal voyages made by all the migratory birds across its waters. About the Lipari Islands alone it would be easy to find materials for an instructive chapter, since many rare birds are often found resting, as if on shipboard, upon their vitrified cones and pinnacles. But when the swallow touches at these isles, it must be for pleasure, not through weariness, since it would be easy for it, with its strong wings, to proceed onward to Sicily. Yet it may often be seen diving, so to speak, through the white smoke of Vulcano, or skimming along the rocky shores of Felicudi. Having performed these feats to its satisfaction, it plunges away toward the Faro, as if in search of the misty glories of the Fata Morgana."

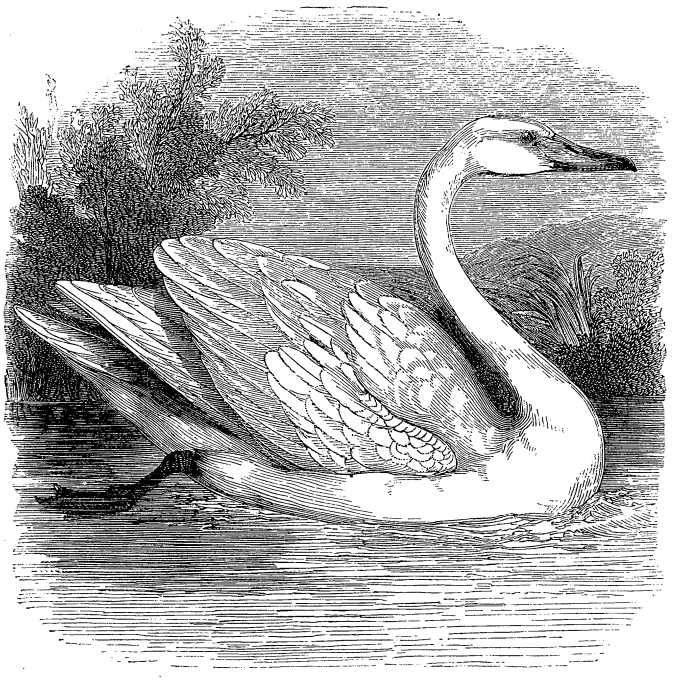
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FLAMINGOES.

large swan moving in its usual majestic manner over the smooth surface of the water. Such is their beauty, that for centuries many of them have been domesticated in Europe, and used as ornaments on lakes, rivers, and reservoirs, in the pleasure-grounds of palaces, villas, and chateaux. Their wings are very long and powerful, and many of them perform long migrations, during which they always fly in single lines. Their diet is principally of a vegetable nature, consisting of grass, roots, and seeds; but they are said also to feed upon worms and aquatic insects. Swans are gregarious at all seasons. The nest, which is very bulky, is composed of grass, rushes, and coarse herbage, and placed on the ground, generally among the sedges near the water; and several observers have stated that the swan, when sitting, has been known to add considerably to the materials of her nest, so as to raise it sometimes as much as two feet or two feet and a half, in anticipation of heavy rains, which swelled the waters to such an extent that the nest, if left in its original condition, would have been completely submerged. The male remains in company with the female during the period of incubation, and assists in the care of the young after their exclusion from the shell. Young swans are called *Cygnets*.

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THE MUTE SWAN.

It is a curious fact that swans live to a great age; in some instances, it is said, to nearly a hundred years.

The Hooper or Whistling Swan, *C. ferus* of Ray, *C. musicus* of Bechstein, is the *Cygne Sauvage* of the French, *Cigno Salvatico* of the Italians, *Singschwan* of the Germans. It derives its popular name from its loud, sonorous cry of *hoop, hoop, hoop*, often repeated. It is supposed to be the swan of the ancients, which was said to utter a sweet and plaintive song when dying. This, as well as some other species of swan, has a low, soft note, but not reserved for the moment that precedes death. This species is frequently domesticated in the north of Europe; in a wild state its migrations extend over Europe, its winter haunts, however, being in the warm parts of Asia and Africa. It is about twice the size of a goose, and is perfectly white.

The Mute Swan, *C. olor*, is somewhat larger than the preceding, and is of a more graceful carriage; it is in fact the species chiefly domesticated as the ornament of rivers, lakes, and fountains. It is four feet eight inches to five feet long, and weighs about thirty pounds. Its nest is formed on the ground, usually on an island, near the edge of the water, and consists of a large mass of reeds, rushes, and other coarse herbage; the eggs are six or seven, of a dull greenish-white. During incubation the male guards the female with jealous care, and inflicts serious blows with the beak and wings upon any intruder. The young cygnets are led, or sometimes carried on the back by the female, to the water, as soon as hatched. No spectacle can be more pleasing than a pair of swans with their train of cygnets reposing or gliding upon the water. This bird is found wild during summer in Northern Europe; in winter it migrates to the south; it is stationary in Greece, Asia Minor, &c. It has long been domesticated in England, and formerly extensive swanneries existed on the Thames and other sheets of water. In 1625 no less than two thousand swans, in one flock, were to be seen upon the Avon! The swan was considered a bird-royal, and no person was permitted to keep them, except by royal grant. The king had swanneries and swanherds, not only on the Thames, but in various other parts of the kingdom. All the swans were marked, each owner having a particular sign. The statutes regulating the swanneries would fill a volume. There are still several large swanneries upon the Thames, chiefly belonging to the crown and to the "Dyers and Vintners'" companies. They are annually

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marked on the bills by men called *Swan-Uppers* or *Swan-Hoppers*. There are also swanneries in other parts of the kingdom. At Norwich, according to Yarrell, the swans, about seventy in number, belong to the city, and are presided over by a public swanherd. The young birds are esteemed a great delicacy for the table. The following recipe is the standard guide for their cookery:

TO ROAST A SWAN.

Take three pounds of beef, beat fine in a mortar,
Put it into the Swan—that is, when you've caught her;
Some pepper, sauce, mace, some nutmeg, an onion,
Will heighten the flavor in gourmand's opinion.
Then tie it up tight with a small piece of tape,
That the gravy and other things may not escape.
A meal paste, rather stiff, should be laid on the breast,
And some whited brown paper should cover the rest.
Fifteen minutes at least ere the Swan you take down,
Pull the paste off the bird that the breast may get brown.

THE GRAVY.

To a gravy of beef, good and strong, I opine,
You'll be right if you add half a pint of port wine;
Pour this through the Swan—yes, quite through the belly,
Then serve the whole up with some hot currant-jelly.

Bewick's Swan, *C. Bewickii*, is nearly four feet long, and white, having somewhat the air air and manners of a goose on the water; it is migratory, breeding in summer in the north of Europe, and spending the winter at the south.

The Polish Swan or Changeless Swan, *C. immutabilis*, is another wild species, fifty-six inches long, plumage white, and in habits resembling the preceding. A male of this species paired with a female Mute Swan at Knowsley, and a hybrid brood was the result. These, however, did not pair either among themselves or with others.

Formerly swans were all supposed to be white, and "white as a swan" was equivalent to "white as snow;" but Australia, amid its anomalies, has furnished to natural history a Black Swan, *C. atratus*. It is nearly the size of the swans we have described, and has similar manners, but it is entirely black, except a few white feathers on the wings. It is abundant in Van Diemen's Land, and along the Swan River country in Western Australia.

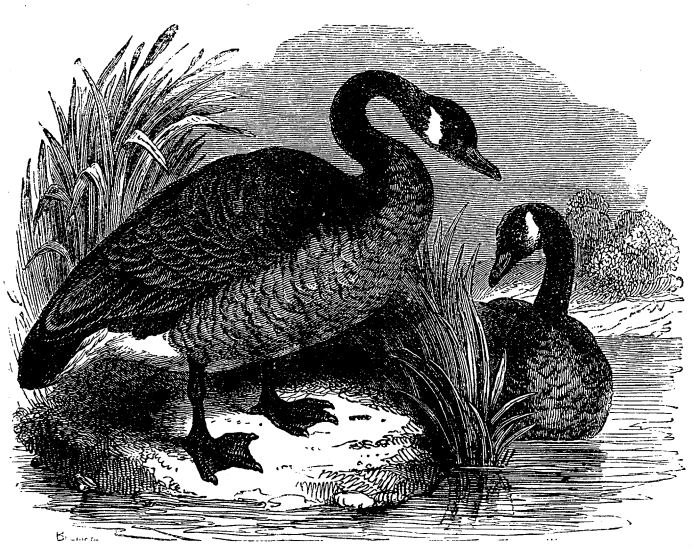
The American Swan, *C. Americanus*, formerly supposed to be the same as the Hooper Swan of Europe, is about five feet five inches long, white, and breeds in the high northern regions of this continent. It is often seen in spring—the flock arranged in a triangular line, and high in air—winging its way to the distant lakes, where it builds its nest and rears its young. Many of these birds spend the winter as far north as Chesapeake Bay; it is said to be abundant along the western shores of North America.

The Trumpeter-Swan, *C. buccinator*, is fifty-three inches long, white, and has a harsh, trumpet-like note; habits similar to the preceding. It is this species which furnishes the *swan-skins* imported into London by the Hudson's Bay Company; it is, however, chiefly known from the Mississippi Valley to the Pacific.

THE ANSERINÆ OR GEESE.

Genus ANSER: *Anser*.—To this belong the principal species of Geese, which, as is well known, are migratory, move in flocks, and feed upon vegetable substances along the borders of salt as well as fresh waters. The Domestic Goose—*Oie ordinaire* of the French—is too familiar to need description. It is derived from the *Gray Lag-Goose*, the *Common Wild Goose* of Europe. It is not mentioned in the Bible, but it was known to the ancient Egyptians, and is figured abundantly on the monuments, showing that it was anciently used for food, as in our own times. It was held sacred by the Romans, because it was said, by its cackling at night, to have alarmed the sentinels of the Capitol upon the invasion of the Gauls, and thus to have saved the city. It is generally esteemed a foolish bird, yet it displays courage in defending its young, and instances of attachment and gratitude have shown that it is not deficient in sentiment. Its utility to man has rendered it an object of careful cultivation. The quantity raised in England is really astonish-

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THE CANADA GOOSE, OR WILD GOOSE OF AMERICA.

ing. Pennant says: "Tame geese are kept in vast multitudes in the fens of Lincolnshire; a single person has frequently one thousand old geese, each of which will rear seven, so that toward the end of the season he will become master of eight thousand. During the breeding season these birds are lodged in the same houses with the inhabitants, and even in their very bed-chambers; in every apartment are three rows of coarse wicker-pens, placed one above another; each bird has its separate lodge divided from the other which it keeps possession of during the time of sitting. A person called a *Gozzard*, that is, *Gooseherd*, attends the flock, and twice a day drives the whole to water; then brings them back to their habitations, helping those that live in the upper stories to their nests, without ever misplacing a single bird. The geese are plucked five times in the year; the first plucking is at Lady-Day, for feathers and quills, and the same is renewed four times more between that and Michaelmas for feathers only. The old geese submit quietly to the operation, but the young ones are very noisy and unruly. I once saw this performed, and observed that goslins of six weeks old were not spared; for their tails were plucked, as I was told, to habituate them early to what they are to come to. If the season proves cold, numbers of the geese die by this barbarous custom. When the flocks are numerous, about ten pluckers are employed, each with a coarse apron up to his chin. Vast numbers of geese—sometimes two or three thousand in a flock—are driven annually to London to supply the markets, among them all the superannuated geese and ganders—called the '*Cagmags*'—which, by a long course of plucking, prove uncommonly tough and dry. The feathers are a considerable article of commerce; those from Somersetshire are esteemed the best, and those from Ireland the worst." The liver seems to have been a favorite morsel with epicures in all ages, and invention appears to have been active in exercising the means of increasing the volume of that organ. The *pâté de foie d'oie de Strasbourg* is not more in request now than were the great goose-livers in the time of the Romans. This bird lives to a great age, sometimes seventy years or more.

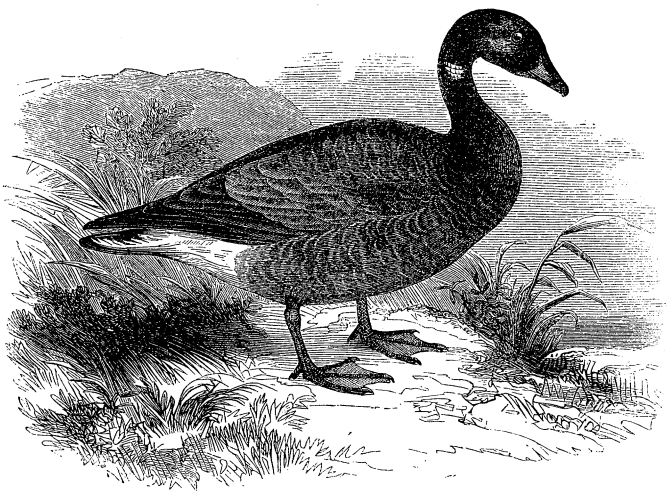
The GRAY LAG-GOOSE, *A. ferus*, is thirty-five inches long; upper parts ash-brown and ash-gray; under parts white. It is migratory, proceeding to the northern parts of Europe and Asia in summer, and to the south in winter. This is the *Common Wild Goose* of England.

Other foreign species are the BEAN GOOSE, *A. segetum:* the PINK-FOOTED GOOSE, *A. brachyrhynchus:* the RED-BREASTED GOOSE, *A. ruficollis:* the EGYPTIAN GOOSE, *A. Ægyptiacus:* the SPUR-WINGED or GAMBO GOOSE, *A. Gambensis.* There are several species in Asia not here enumerated.

The following are found on both continents: the WHITE-FRONTED or LAUGHING GOOSE, *A. albifrons*, is twenty-seven inches long; common in Europe and in the North American Fur Countries, but rare along our coasts: the BERNICLE GOOSE, *A. leucopsis*, twenty-five inches long; was formerly supposed to be bred from bernicles, whence its name; found in Europe; abundantly in the Baltic, and occasionally, it is said, in Hudson's Bay: the BRENT GOOSE, *A. torquatus*, a small species, twenty-one inches long; common in both Europe and America. On our coast it is a favorite game bird, known by the name of *Brant.*

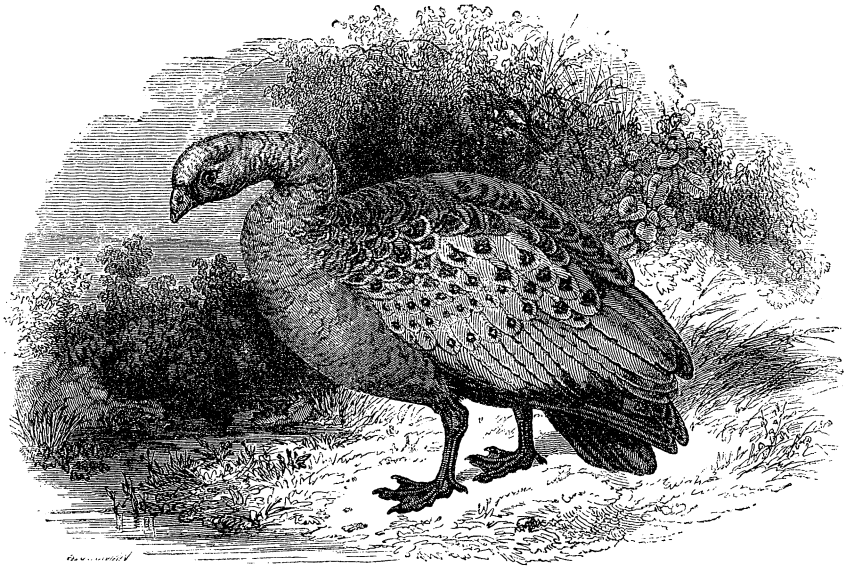
The SNOW-GOOSE, *A. hyperboreus*, is twenty-eight inches long, and is known on our coast by the names of *White Brant* and *Blue-winged Goose.*

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THE BRENT GOOSE.

The CANADA or CRAVAT GOOSE, *A. Canadensis*, the *Wild Goose* of this country, is a fine species, forty inches long, often seen in spring and autumn in large triangular flocks, high in air, and led by an old and experienced gander, who frequently utters a loud *honk*, doubtless equivalent to the cry of the watchman of the ship or the city, "All's well!" Often this sound comes upon the ear at night when the flock are invisible; nay, even in the daytime, when they are beyond the reach of vision, it is frequently heard, seeming to come from the sky. Immense numbers of these noble birds are killed in Canada, as well as along our coasts, where they assemble in the autumn in large flocks, and remain till driven to more southern climates by the season.



THE CEREOPSIS GOOSE.

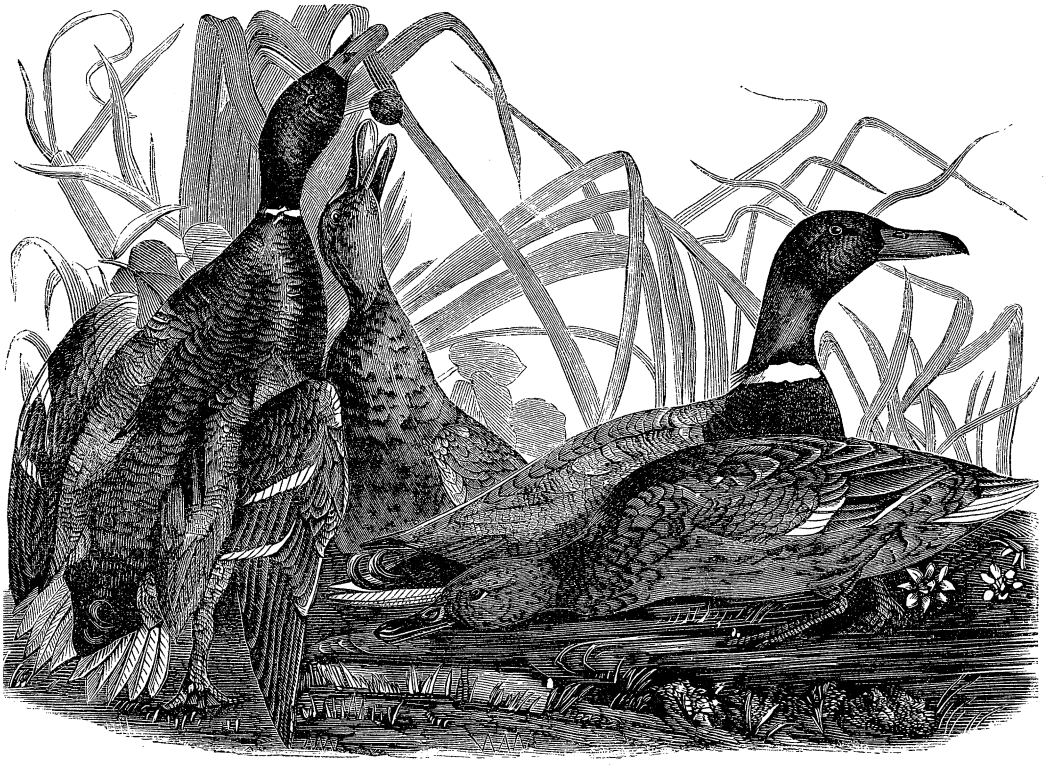
Genus CEREOPSIS: *Cereopsis.*—This includes a very curious bird, the CEREOPSIS GOOSE, *C. Novæ Hollandiæ*, about the size of a common goose, of a dusky gray color, most of the wing-coverts and secondary quill-feathers marked with round dusky spots. It has the air and manners of the goose family; is found in considerable numbers on the sea-shore of Lucky Bay and Goose Island, at the southeastern point of Australia. It weighs from seven to ten pounds; the flesh is excellent. It has frequently bred in the Zoological Gardens of London.

The SWAN GOOSE, *Anseranas melanolema*, found in Australia, has semipalmated feet, a knob on the head, long legs, and a form somewhat resembling the swan. It was formerly found in immense flocks in certain districts, and afforded a considerable part of the food of the natives, who struck it down with their spears. At present, it is chiefly confined to the northern parts of the island. Specimens have been in the London Zoological Gardens.

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HUTCHINS'S GOOSE, *A. Hutchinsi*—called *Mud Goose* on Long Island—is twenty-five inches long; breeds along the Arctic Sea, and is common upon our coasts. Some have supposed it a hybrid between the *Brant* and *Wild Goose*. Mr. Linsley, in his Catalogue of the Birds of Connecticut, states that it is not unfrequently taken there in spring, and is called the *Southern Goose*, because it does not winter there.

The following are in the catalogue of the Smithsonian Institution: WHITE-HEADED GOOSE, *A. cærulescens;* found in North America: *A. frontalis*, interior of North America: WHITE-CHEEKED GOOSE, *Bernicla leucopareia*, west coast of North America: BLACK BRANT, *B. nigricans*, Pacific coast of North America; rare on the Atlantic coast: PAINTED GOOSE, *Chloephaya canagica*, Aleutian Islands.



MALLARDS.

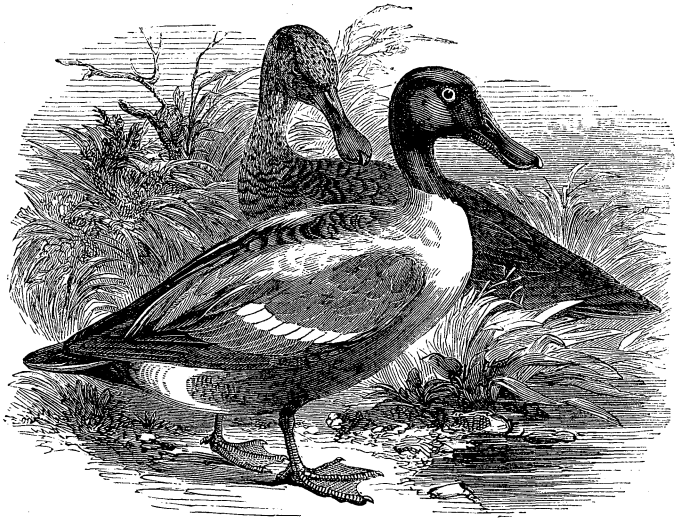
THE TRUE DUCKS.

These closely resemble the preceding group in their general conformation, and in the form of the bill. They all frequent fresh water, where they feed upon the worms, mollusca, and larvæ which they pick out of the mud. A considerable portion of their food, however, consists of vegetable matter, such as grass, roots, seeds, &c. They are gregarious in their habits, and generally migrate in large flocks. The males are larger than the females, and often adorned with beautiful colors, while the females are usually of a more uniform and sober tint. In winter, most of them resort to the borders of the sea.

They moult twice in the year, in June and November; in June, the males acquire the female plumage to a certain extent, but they regain their proper dress at the second moult, and retain it during the breeding season. The nest is usually placed on the ground among reeds and sedges near the water, sometimes in holes or in hollow trees, but rarely among the branches. The eggs vary from about eight to fourteen in number, and the young are active from the moment of their exclusion, and soon take to the water, where they are as much at home as the old birds. As the flesh of ducks is greatly valued, immense numbers of the wild ones are shot or taken in other ways. In England large quantities are captured by decoys, consisting of a piece of water situated

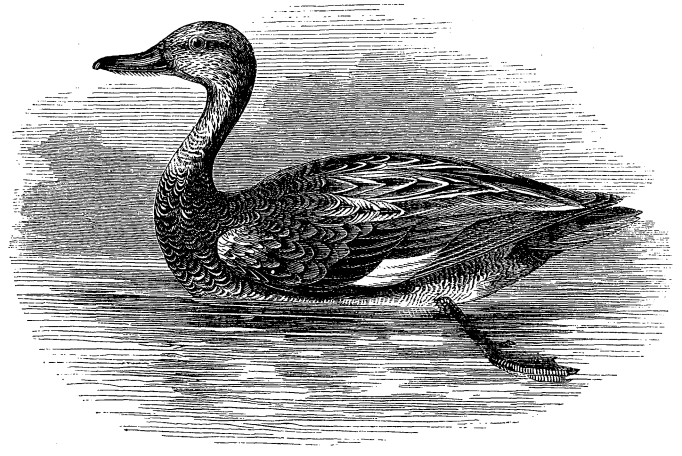
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in the midst of a quiet plantation, from which six semicircular canals are cut, which are roofed over with hoops and covered in with netting. Into this vast trap the ducks are enticed by young ducks trained for the purpose.



THE SHOVELER.

Genus ANAS: *Anas.*—To this belongs the COMMON WILD DUCK or MALLARD, *A. boschas*, the original of all the domestic varieties. It is twenty-four inches long, and marked with green, chestnut, and white. It is an inhabitant of all the countries of Europe, especially toward the north, and is also abundant in North America. Here it is migratory, passing to the North in spring and returning to the South in autumn. It frequents the lakes of the interior as well as the sea-coasts. It is plentiful in Great Britain at all seasons, merely quitting the more exposed situations at the approach of winter and taking shelter in the valleys; or, in case of a severe winter, visiting the estuaries. In a wild state, the mallard always pairs, and during the period of incubation the male, although he takes no part in the process, always keeps in the neighborhood of the female; and it is singular that half-bred birds between the wild and tame varieties always exhibit the same habit, although the ordinary domestic drakes are polygamous, always endeavoring to get as many wives as they can.

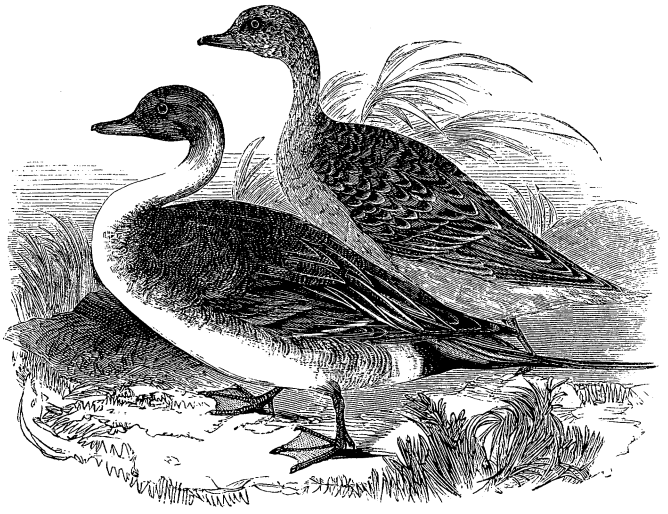


THE GADWALL.

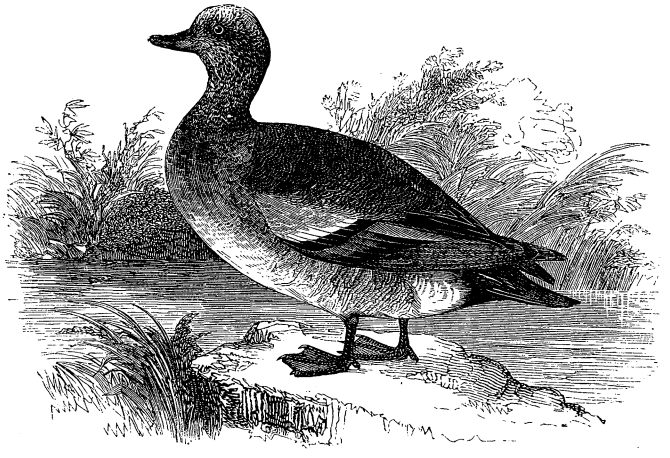
The SHOVELER, *A. clypeata*, —called also *Broad-Bill* and *Spoon-Bill*—is seventeen inches long, and greatly prized for its flesh; it is also a very beautiful species. It occasionally visits the sea-coast, but is more commonly met with on lakes and rivers, particularly along their muddy shores, where it spends a great part of its time in searching for worms, &c. The female makes her nest on the ground, with withered grass, usually in the midst of tufts of rushes, and lays from ten to twelve eggs. The young are said to be at first very unshapely, having most enormous bills. The shoveler is found in Europe and America.

The GADWALL or GRAY DUCK, *A. strepera*, is nineteen inches long, and is common to Europe and America; very abundant in some countries; common in India. Its flesh is excellent. Wilson says "it is a very quick diver, so as to make it difficult to be shot; it flies also with great rapidity, and utters a note not unlike that of the mallard, but louder; is fond of salines and ponds overgrown with reeds and rushes; feeds during the day, as well as in the morning and evening."

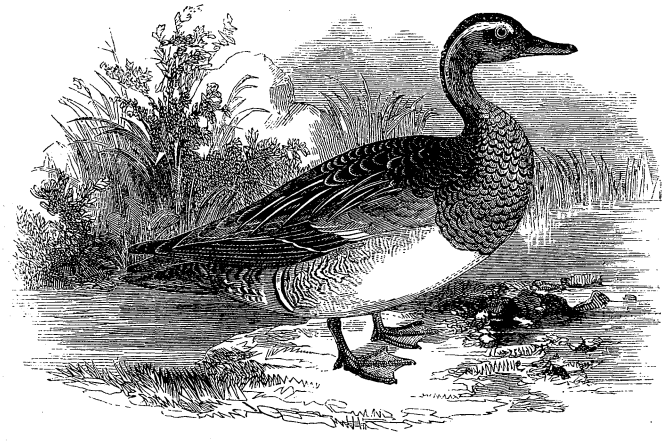
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THE PINTAIL DUCK.



THE AMERICAN WIDGEON.



THE GARGANEY.

The PINTAIL DUCK, *A. acuta*, is, including the tail, twenty-six to twenty-eight inches long; common in Europe and America.

The EUROPEAN WIDGEON, *A. Penelope*, is eighteen inches long; common in Europe, and accidental on the Atlantic coast of the United States.

The AMERICAN WIDGEON or BALDPATE, *A. Americana*—*Mareca Americana* of Gmelin—is nineteen inches long; common in North America; accidental in Europe.

The BLACK DUCK, *A. obscura*, is twenty-two inches long; abundant in the United States; not yet found in Europe.

The GARGANEY or SUMMER TEAL, *A. querquedula*, is sixteen inches long; common in Southern Europe and India.

The ENGLISH TEAL, *A. crecca*—*Nettion crecca* of Linnæus—is fourteen and a half inches long; common in Europe; accidental on the eastern coast of the United States.

The BLUE-WINGED TEAL, *A. discors*, is fifteen inches long; found on the eastern coast of the United States; not yet noticed in Europe, nor on the Pacific.

The RED-BREASTED TEAL—*Querquedula cyanoptera* of Baird—is found on the western coast of North and South America.

The SUMMER DUCK or WOOD DUCK, *A. sponsa*, nineteen inches long, is a very beautiful species; found throughout North America, Mexico, and the West Indies. Wilson says: "During the whole of our winters they are occasionally seen in the States south of the Potomac. On the 10th of January, I met with two on a creek near Petersburgh, in Virginia. In the more northern districts, however, they are migratory. In Pennsylvania, the female usually begins to lay late in April or early in May. Instances have been known where the nest was constructed of a few sticks laid in a fork of the

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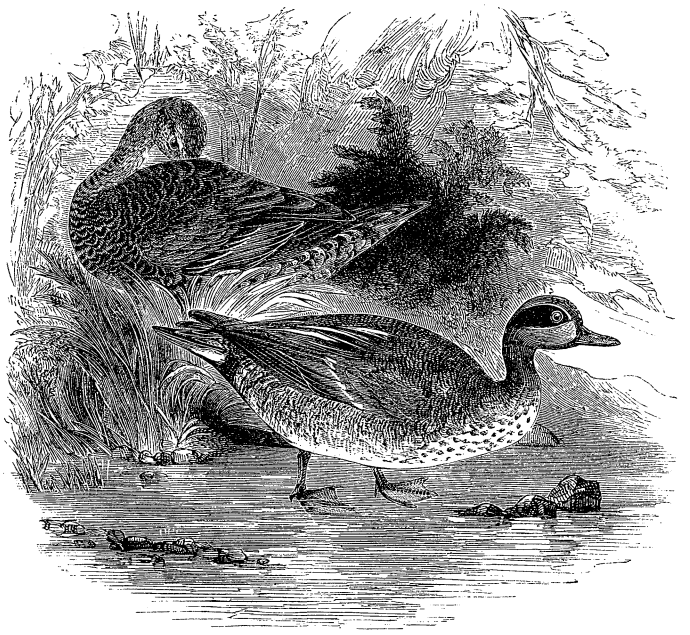


SUMMER OR WOOD DUCKS.

branches; usually, however, the inside of a hollow tree is selected for this purpose. On the 18th of May I visited a tree containing the nest of a Summer Duck, on the banks of Tuckahoe River, New Jersey. It was an old, grotesque white oak, whose top had been torn off by a storm. It stood on the declivity of the bank, about twenty yards from the water. In this hollow and broken top, and about sixteen feet down, on the soft, decayed wood, lay thirteen eggs, snugly covered with down, doubtless taken from the breast of the bird.

"This tree had been occupied, probably by the same pair, for four successive years, in breeding time; the person who gave me the information, and whose house was within twenty or thirty yards of the tree, said that he had seen the female, the spring preceding, carry down thirteen young, one by one, in less than ten minutes. She caught them in her bill by the wing or back of the neck, and landed them safely at the foot of the tree, whence she afterward led them to the water. The male usually perched on an adjoining limb, and kept watch while the female was laying, and also often while she was sitting. A tame goose had chosen a hollow space at the root of the same tree, to lay and hatch her young in.

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ENGLISH TEAL. (See p. 317.)

"The Summer Duck seldom flies in flocks of more than three or four individuals together, and most commonly in pairs, or singly. The common note of the drake is *peet, peet;* but when, standing sentinel, he sees danger, he makes a noise not unlike the crowing of a young cock—*oe eek! oe eek!* Their food consists principally of acorns, seeds of the wild oats, and insects. Their flesh is inferior to that of the blue-winged teal. Among other gaudy feathers with which the Indians ornament the calumet or pipe of peace, the skin of the head and neck of the summer duck is frequently seen covering the stem. This beautiful bird has often been tamed, and soon becomes so familiar as to permit one to stroke its back with the hand. I have seen individuals so tamed in various parts of the Union." It is called *Wood-Duck* from breeding in hollow trees, and *Summer Duck* from remaining with us during the summer. It rarely visits the sea-shore or salt marshes, its favorite haunts being the solitary, deep, and muddy creeks, ponds, and mill-dams of the interior.

The MANDARIN DUCK, FAN-TAIL DUCK, or CHINESE TEAL, *A. galericulata*, is remarkable for the brilliancy of its plumage, a fine green crest on the head, a fan-shaped tuft of feathers on the back, and still more for its conjugal fidelity. It is said never to mate a second time. In regard to this Mr. Davis furnishes the following particulars: "From an aviary containing a pair of these birds at Macao, the drake happened one night to be stolen. The duck was perfectly inconsolable, like Calypso after the departure of Ulysses. She retired into a corner, neglected her food and person, refused all society, and rejected with disdain the proffer of a second love. In a few days the purloined duck was recovered and brought back. The mutual demonstrations of joy were excessive; and what is more singular, the true husband, as if informed by his partner of what had happened in his absence, pounced upon the would-be lover, tore out his eyes, and injured him so much that he soon after died of his wounds." This species is domesticated in China and Japan.

The preceding are generally included under the genus *Anas:* the following, though distributed in various genera, have nevertheless the general characteristics of the true ducks.

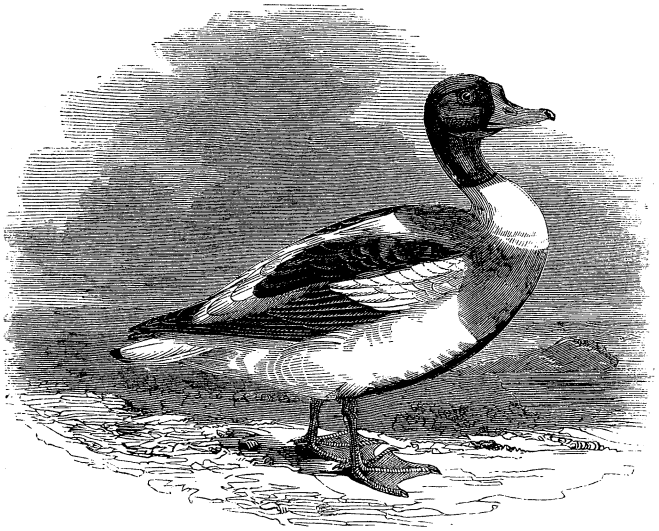
Genus TADORNA: *Tadorna.*—This includes the European *Sheldrakes.* The RUDDY SHELDRAKE, *T. rutila*, is twenty-six inches long, and distributed throughout Europe and Asia. Its voice when flying is like a clarionet; sometimes it cries like a peacock, and sometimes it clucks like a hen. The Tartars say its flesh is poisonous; Baron de Tott says he tasted of it and found it

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THE MANDARIN DUCK.

"exceedingly good for nothing." The Common European Sheldrake, or Burrow-Duck, *T. vulpanser*, is twenty-four inches long, and sometimes breeds in rabbit-burrows. It is found in all parts of Europe. In the Orkneys it is called *Sly Goose*, on account of its tricks. When a person comes near its nest it pretends to have a wing broken, and waddles away in a doleful manner, the wing trailing on the ground; when the stranger has pursued it in vain for some time, it suddenly takes flight, and leaves the outwitted Orcadian gaping with wonder.

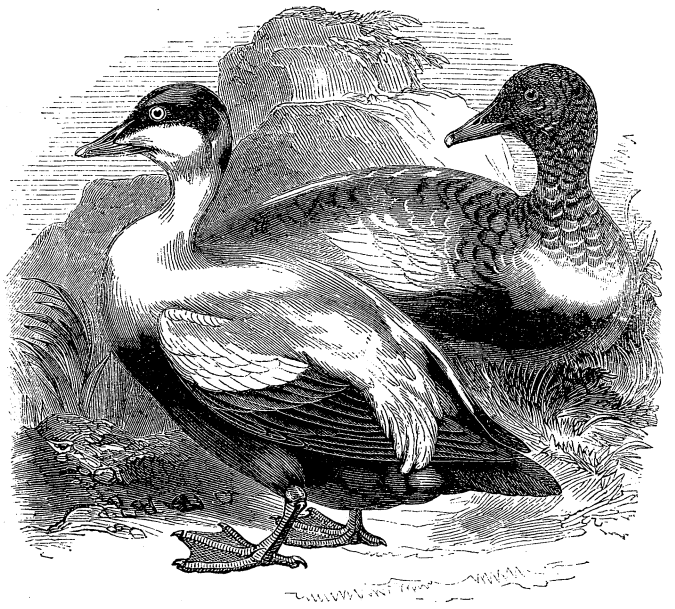


THE COMMON SHELDRAKE OF EUROPE.

The Eider Duck, *Somateria mollissima*, is twenty-five inches long, and is remarkable for its soft down. It is found throughout the north of Europe and of North America, and usually builds its nests on the rocky precipices which overhang the ocean. The down so much valued is plucked off the breast by the female to line her nest. Nuttall says: "As soon as the young are hatched they are led to the water by their attentive parent, and there remain, excepting in the night and in tempestuous weather. Their greatest enemy, besides man, is the Saddle-Back Gull; the young, however, elude his pursuit by diving, at which both old and young are very expert. The down, though so valuable, is neglected in Labrador. It is so light and elastic, that two or three pounds of it, pressed into a ball that may be held in the

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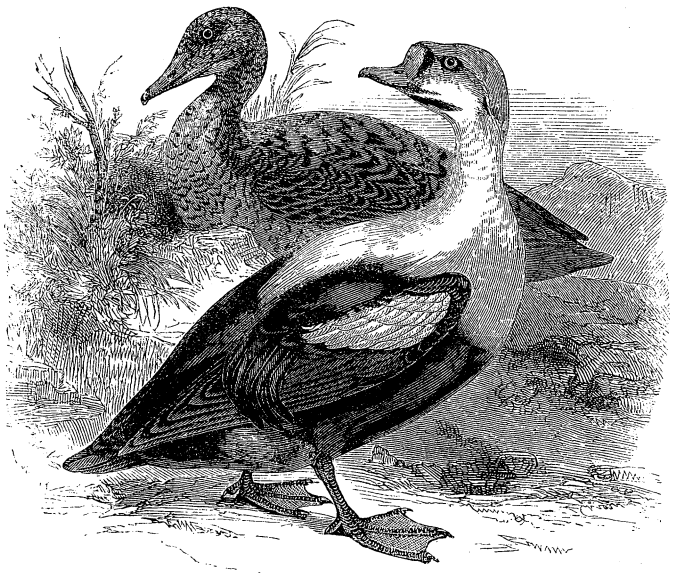
hand, will swell out to such an extent as to fill and distend the foot-covering of a large bed. The best kind, termed *live-down*, is that which the Eider plucks to line the nest; the down taken from the dead bird is greatly inferior, and it is rare that so valuable a bird is now killed for the purpose. To augment the quantity of down from the same bird, the eggs, which are very palatable, are taken and eaten, and the female again strips herself to cover the second and smaller hatch. If the nest be a second time plundered, as the female can furnish no additional lining, the male now lends his aid, and strips the coveted down from his breast, which is well known by its paler color. The last laying, of only two or three eggs, is always left to kindle their hopes of progeny, for if this be taken they will abandon the place; but thus indulged, they continue to return the following year, accompanied by their young. The most southern breeding place of this species in Europe is the Fern Isles, on the coast of Northumberland; and voyagers who have ventured to the dreary extremity of Arctic Europe, hear, in summer, from the caverns and rocks of the final cape, the deep moan of the complaining Eider. The eggs are commonly five or six, but it is not unusual to find upward of ten in the same nest, which is thus occupied peaceably by two females. In Norway and Iceland the Eider districts are considered as valuable property, carefully preserved, and transmitted by inheritance. There are spots that contain many hundreds of these nests, and the Icelanders are at the utmost pains to invite the Eiders, each into his own estate; and when they perceive that they begin to frequent some of the islets which maintain herds, they soon remove the cattle and dogs to the main-land, to procure the Eiders an undisturbed retreat; and to accommodate them, sometimes cut out holes in rows on the smooth sloping banks, of which, to save themselves trouble, they willingly take possession and form their nests. These people have even made many small islands for this purpose, by disjoining promontories from the continent. It is in these retreats of peace and solitude that the Eiders love to settle; though they are not averse to nestle near habitations, if they experience no molestation. 'A person,' says Horrebow, 'as I myself have witnessed, may walk among these birds while they are sitting and not scare them; he may even take the eggs, and yet they will renew their laying as often as three times.' According to the relation of Sir George Mackenzie, on the 8th of June, at Vidöe, the Eider-Ducks, at all other times of the year perfectly wild, had now assembled in great numbers to nestle. The boat by which they approached the shore passed through multitudes of these beautiful birds, which scarcely gave themselves the trouble to go out of the way. Between the landing place and the governor's house the ground was strewed with them, and it required some caution to avoid treading on the nests. The drakes were walking about, uttering a sound very like the cooing of doves, and were even more familiar than the common domestic ducks. All round the house, on the garden wall, on the roofs, and even in the inside of the houses, and in the chapel, were numbers of ducks sitting on their nests. Such as had not been long on the nest generally left it on being approached; but those that had more than one or two eggs sat perfectly quiet, suffering us to touch them, and sometimes making a gentle use of their bills to remove our hands. When a drake happens to be near his mate, he is extremely agitated



EIDER DUCKS.

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when any one approaches her. He passes and repasses between her and the object of his suspicion, raising his head and cooing. One female, during the whole time of laying, generally gives half a pound of neat down, and double that quantity before cleansing."



THE KING DUCK.

The KING DUCK, *S. spectabilis*, is a trifle smaller than the preceding; it so much resembles it in habits that it is sometimes called the *King Eider*; found in the Arctic regions of Europe, Asia, and N. America.

STELLER'S WESTERN DUCK, *S. adispar*, nineteen inches long, inhabits the western parts of North America, Europe, and Asia, and it has been accidentally met with in England.

The SPECTACLED EIDER, *Lampronetta Fischeri*, is found on the coast of Russian America.

The VELVET SCOTER, *Oidemia fusca*—De Kay's *White-winged Coot*—22 inches long; is common in Europe and N. America.

The COMMON SCOTER OF EUROPE, *O. nigra*, is nineteen inches long; common in the South of Europe.

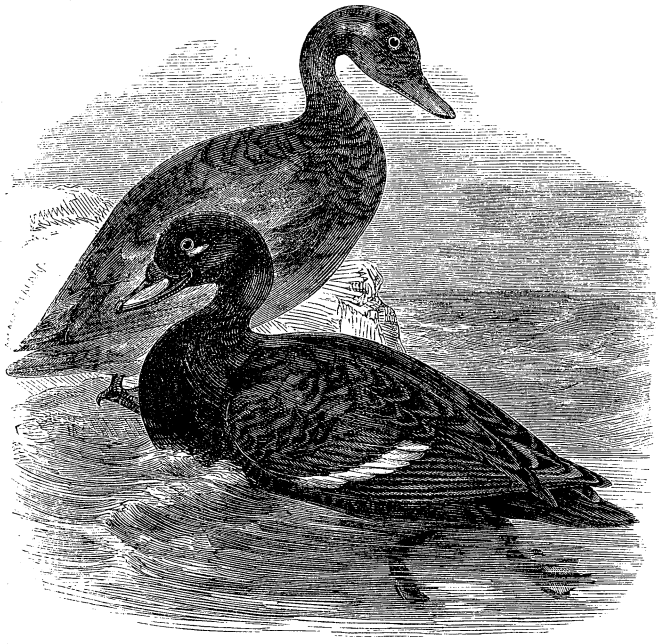
The SURF SCOTER or COOT, *O. perspicillata*, twenty-one inches long; is common in North America; accidental in Europe.

The COMMON AMERICAN SCOTER, *O. Americana*, sometimes called *Broad-billed Coot*, is abundant along the sea-coast of N. America.

The HURON SCOTER, *O. bimaculata*, is found in fall and winter on Lake Huron and the adjacent waters.

The LONG-BILLED SCOTER, *Pelionetta Trowbridgii*, is found in winter along the southern coast of California.

The RED-CRESTED WHISTLING DUCK, *Fuligula rufina*, is twenty two inches long; found throughout Europe and Asia.



THE VELVET SCOTER.

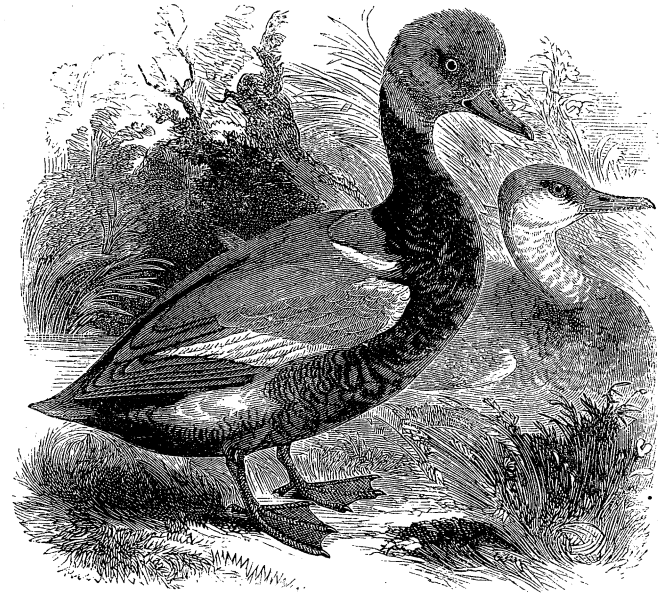
The POCHARD or DUN-BIRD, *F. ferina*, nineteen and a half inches long, resembling the Canvas-Back of the United States, is found in parts of Europe; in England it is called *Red-headed Poker* and *Red-eyed Poker*.

The RED-HEAD, *F. erythrocephala*, is eighteen inches long; found in North America. It was formerly considered as identical with the preceding. It closely resembles the Canvas-Back.

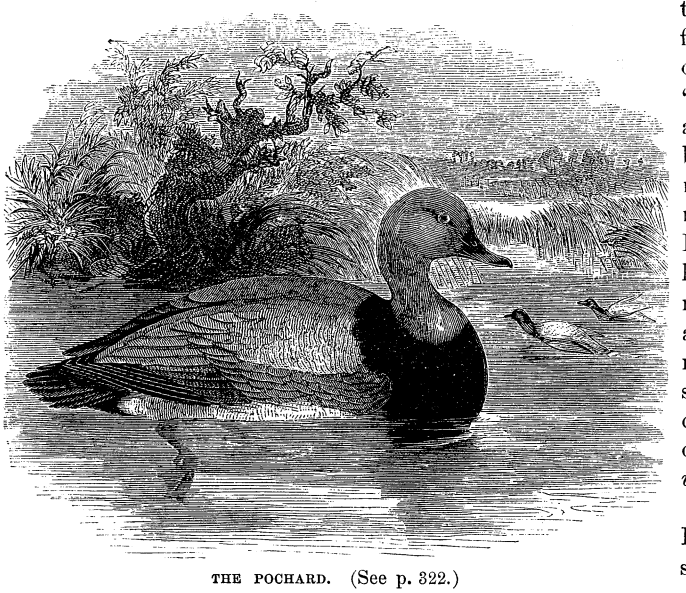
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The Ferruginous Duck or White-Eye, *F. nyroca*, is sixteen inches long; common in Europe.

The Scaup Duck, *F. marila*—called *Broad-Bill*, *Blue-Bill*, *Black-Head*, and *Raft-Duck* in this country—is nineteen inches long; common in Europe and America.



THE RED-CRESTED WHISTLING DUCK. (See p. 322.)



THE POCHARD. (See p. 322.)

The American Scaup Duck, *F. mariloides*—the Creek Broad-Bill of De Kay—is common in North America; accidental in Europe. (See p. 324.)

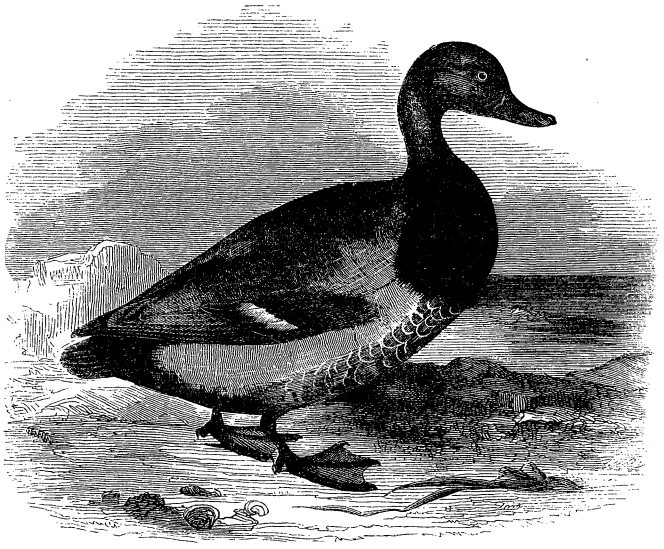
The Bastard Broad-Bill, *F. rufitorques*—the *Ring-Neck Duck* of Audubon—16 inches long, is found from Massachusetts to Mexico.

The Canvas-Back, *F. valisneria*—*Aythya valisneria* of Bonaparte—is 20 inches long; general color above grayish-white, with numerous minute undulating bars of black; rump blackish; head and neck chestnut red; neck and breast brownish-black; beneath white. It is altogether an American bird; stands unrivaled for the table; breeds in high northern latitudes; appears on our coasts from the North about the middle of October. Wilson says: "A few descend to the Hudson and Delaware, but the great body resort to the numerous rivers belonging to and in the neighborhood of Chesapeake Bay, particularly the Susquehannah, the Patapsco, Potomac, and James Rivers, which appear to be their general winter rendezvous. Beyond this, to the south, I can find no certain accounts of them. At the Susquehannah, they are called *Canvas-Backs;* on the Potomac, *White-Backs;* and on James River, *Sheldrakes.* They are seldom found at a great distance up any of these rivers, or even in the salt-water bay; but in that particular part of tide-water where a certain grass-like plant grows, on the roots of which they feed. This plant, which is said to be a species of *valisneria*, grows on fresh-water shoals of from seven to nine feet, in long, narrow, grass-like blades, of four or five feet in length; the root is white, and has some resemblance to small celery. This grass is in many places so thick that a boat can with difficulty be rowed through it, it so impedes the oars. The shores are lined with large quantities of it, torn up by the ducks, and drifted up by the winds, lying, like hay, in windrows. Wherever this plant grows in abundance, the Canvas-Backs may be expected, either to

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pay occasional visits or to make it their regular residence during the winter. It occurs in some parts of the Hudson; in the Delaware near Gloucester, a few miles below Philadelphia; and in most of the rivers that fall into the Chesapeake, to each of which particular places these ducks resort; while in waters unprovided with this nutritive plant, they are altogether unknown.

"On the first arrival of these birds in the Susquehannah, near Havre-de-Grace, they are generally lean; but such is the abundance of their favorite food that, toward the beginning of November, they are in pretty good order. They are excellent divers, and swim with great speed and agility. They sometimes assemble in such multitudes as to cover several acres of the river, and when they rise suddenly, produce a noise resembling thunder. They float about these shoals, diving and tearing up the grass by the roots, which is the only part they eat. They are extremely shy, and can rarely be approached, unless by stratagem. When wounded in the wing they dive to such prodigious distances, and with such rapidity, continuing it so perseveringly, and with such cunning and active vigor, as almost always to render the pursuit hopeless. From the great demand for these ducks, and the high price they uniformly bring in market, various modes are practiced to get within gunshot of them. The most successful way is said to be decoying them to the shore by means of a dog, while the gunner lies closely concealed in a proper situation. The dog, if properly trained, plays backward and forward along the margin of the water; and the ducks, observing his maneuvers, enticed perhaps by curiosity, gradually approach the shore, until they are sometimes within twenty or thirty yards of the spot where the gunner lies concealed, and from which he rakes them, first on the water, and then as they rise. This method is called *tolling them in.* If the ducks seem difficult to decoy, any glaring object, such as a red handkerchief, is fixed round the dog's middle, or to his tail; and this rarely fails to attract them. Sometimes, by moonlight, the sportsman directs his skiff toward a flock whose position he had previously ascertained, keeping within the projecting shadow of some wood, bank, or headland, and paddles along so silently and imperceptibly as often to approach within fifteen or twenty yards of a flock of many thousands, among whom he generally makes great slaughter.



THE AMERICAN SCAUP DUCK. (See p. 323.)

"Many other stratagems are practiced, and, indeed, every plan that the ingenuity of the experienced sportsman can suggest, to approach within gunshot of these birds; but of all the modes pursued, none intimidate them so much as shooting them by night; and they soon abandon the place where they have been thus repeatedly shot at. During the day they are dispersed about; but toward evening collect in large flocks, and come into the mouths of creeks, where they often ride as at anchor, with their head under their wing, asleep, there being always sentinels awake ready to raise an alarm on the least appearance of danger. Even when feeding and diving in small parties, the whole never go down at one time, but some are still left alone on the look-out.

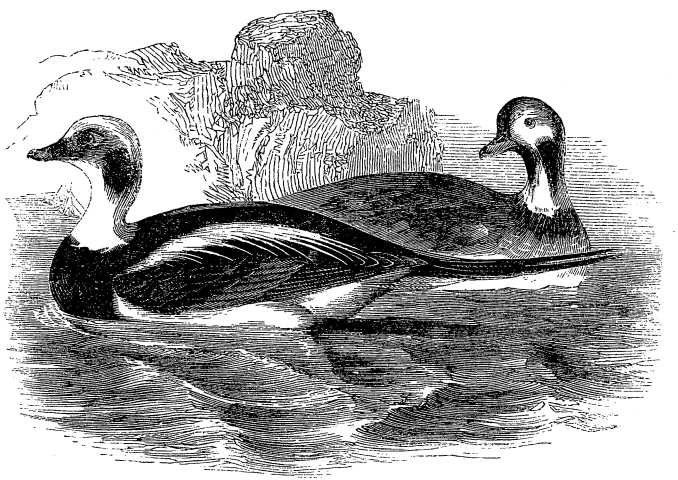
"When the winter sets in severely, and the river is frozen, the Canvas-Backs retreat to its confluence with the bay, occasionally frequenting air-holes in the ice, which are sometimes made for the purpose, immediately above their favorite grass, to entice them within gunshot of the hut or bush, which is usually fixed at a proper distance, and where the gunner lies concealed, ready

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to take advantage of their distress. A Mr. Hill, who lives near James River, at a place called Herring Creek, informs me that, one severe winter, he and another person broke a hole in the ice, about twenty by forty feet, immediately over a shoal of grass, and took their stand on the shore in a hut of brush, each having three guns well loaded with large shot. The ducks, which were flying up and down the river in great extremity, soon crowded to this place, so that the whole open space was not only covered with them, but vast numbers stood on the ice around it. They had three rounds, firing both at once, and picked up eighty-eight Canvas-Backs, and might have collected more, had they been able to get to the extremity of the ice after the wounded ones.

"The Canvas-Back, in the rich, juicy tenderness of its flesh, and its delicacy of flavor, stands unrivaled by the whole of its tribe, in this or perhaps any other quarter of the world. Those killed in the waters of the Chesapeake are generally esteemed superior to all others, doubtless from the great abundance of their favorite food which these produce. At our public dinners, hotels, and particular entertainments, the Canvas-Backs are universal favorites. They not only grace but dignify the table, and their very name conveys to the imagination of the eager epicure the most comfortable and exhilarating ideas. Hence, on such occasions, it has not been uncommon to pay from one to three dollars a pair for these ducks; and, indeed, at such times, if they can, they must be had, whatever may be the price.

"The Canvas-Back will feed readily on grain, especially wheat, and may be decoyed to particular places by baiting them with that grain for several successive days. Some few years since a vessel loaded with wheat was wrecked near the entrance of Great Egg Harbor, in the autumn, and went to pieces. The wheat floated out in vast quantities, and the whole surface of the bay was in a few days covered with ducks of a kind altogether unknown to the people of that quarter. The gunners of the neighborhood collected in boats, in every direction, shooting them; and so successful were they, that, as Mr. Beasley informs me, two hundred and forty were killed in one day."



THE LONG-TAILED DUCK.

The Tufted Duck, *F. cristata*, is 17 inches long; widely distributed in Europe and Asia.

The Long-tailed Duck or Old-wife, *F. glacialis*, length seventeen inches, not including the long tail-feathers; is common in Europe and North America. In the Southern States it is called *South Southerly*, on account of its cry.

The Golden-Eye, *F. clangula*, *Bucephala Americana* of Baird —called *Rattle-Wings* by the boat-shooters in England — is nineteen inches long; builds in hollow trees near the water, twelve to twenty feet from the ground. Soon after the young are hatched, the female carries them one by one under her bill, pressed to her neck, to the water. This species belongs to both Europe and America.

Barrow's Golden-Eye, *Bucephala Islandica*, is found in Iceland and on the St. Lawrence.

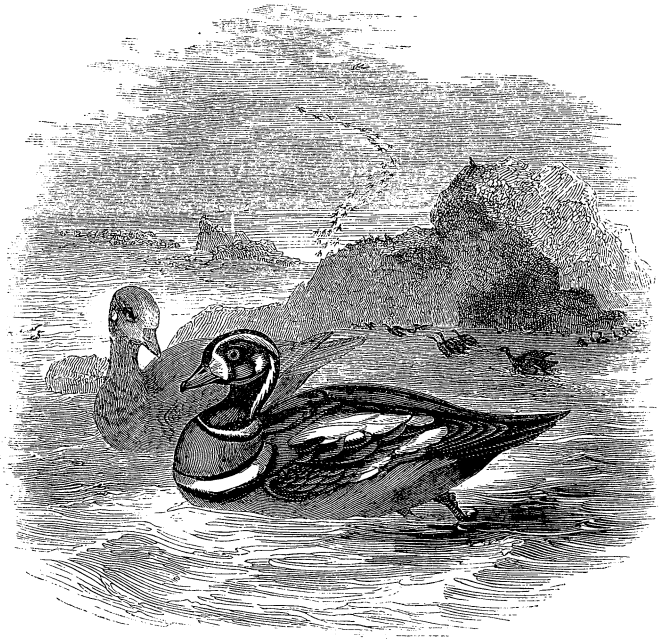
The Harlequin Duck, *F. histrionica*, is a very beautiful but small species, fourteen inches long; fond of the eddying waters of cascades; common in North America; rare in Europe.

The Pied Duck, *F. Labradora*, eighteen inches long, is common on the northeast coast of North America. It is the *Camptolæmus Labradorius* of Gray; called *Skunk-Head* and *Sand-Shoal Duck* on the coast of New Jersey.

The Buffle-Head, *F. albeola*, is thirteen inches long; builds in hollows of trees; common in the

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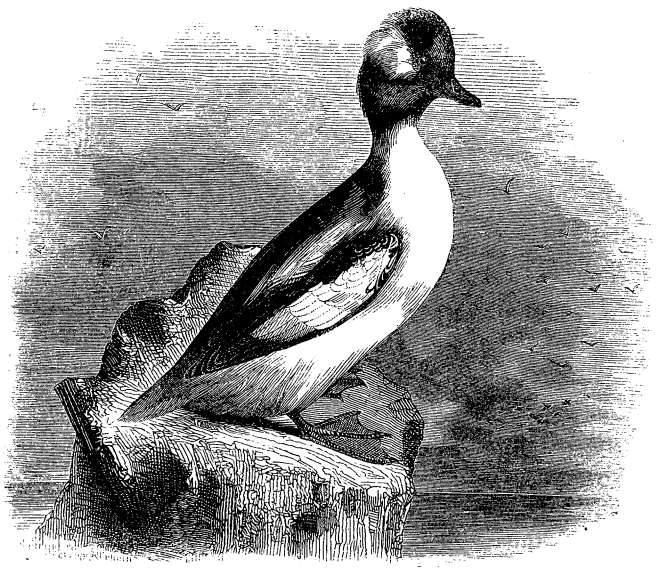
United States; accidental in Europe. This is the *Spirit-Duck* of Nuttall; and is so called by the Indians, on account of its expertness in diving; for the same reason the whites call it *Little Dipper*. It is also named *Butter-Box* and *Butter-Ball*.



THE HARLEQUIN DUCK. (See p. 325.)

The Ruddy Duck, *F. rubida*, is fifteen inches long; abundant throughout the interior of North America; more rare on the coast; is known by the names of *Salt-water Teal*, *Dun-Bird*, *Dun-Diver*, and *Looby*.

In addition to these, the Smithsonian Catalogue has the following: Little Black-Head, *F. affinis;* Ring-Neck Duck, *F. collaris;* Black-masked Duck, *Erismatura Dominica*, &c.; all known in American waters.



THE BUFFLE-HEADED DUCK.

Genus MERGUS: *Mergus.*—This includes the *Mergansers*, which are noted for a thin, roundish bill, with a hooked nail at the point. They inhabit cold, northern regions; are very active on the water, swimming and diving with the utmost facility, and feeding voraciously on fishes and aquatic insects. The nest is composed of roots, grass, &c., and is placed near the water, concealed among bushes and herbage.

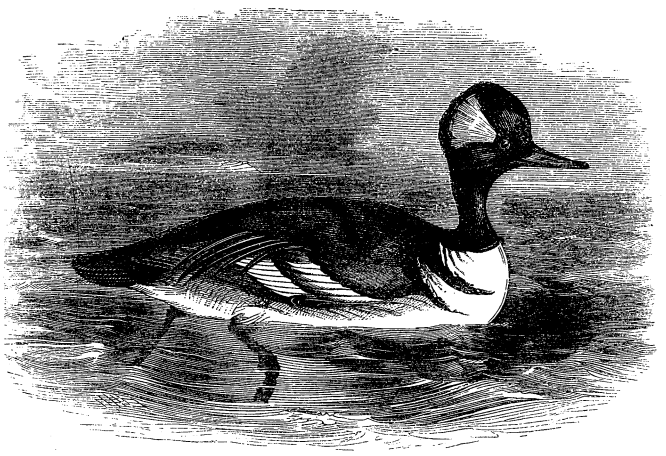
The Hooded Merganser, *M. cucullatus*, a very handsome bird, is nineteen inches long; the head ornamented with a half-circular crest; common in North America; accidental in Europe. This is the *Hooded Sheldrake* of De Kay, and is popularly called *Hairy-Head* and *Water-Pheasant* along our coast.

The Smew or White Nun, *M. albellus*, is seventeen and a half inches long; common in Europe; accidental in the United States.

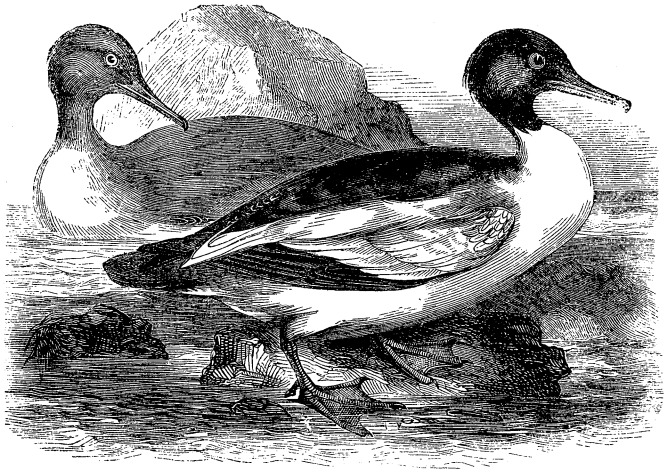
The Red-breasted Merganser, *M. serrator*, is twenty-one inches long; found in Europe and North America. This is the *Red-breasted Sheldrake* of De Kay, and is popularly called *Saw-Bill*, *Whistler*, and *Pied Sheldrake*.

The Goosander, *M. merganser*—*Harle* of the French, *Gansen-Säger* of the Germans, and *Mergo* of the Italians—is a large species, twenty-six and a half inches long; found in Europe and

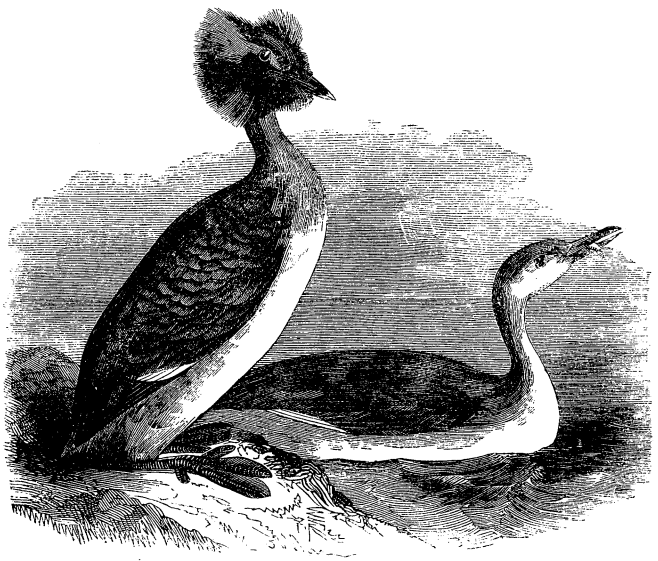
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THE HOODED MERGANSER.



THE GOOSANDER.



THE SCLAVONIAN GREBE.

America. It is the *Buff-breasted Sheldrake* of De Kay, and is sometimes called *Saw-Bill* and *Dun-Diver* on our coast.

THE COLYMBIDÆ.

This family comprises the *Grebes* and *Divers*.

Genus PODICEPS: *Podiceps*.—This includes the *Grebes*, lively and active swimmers which haunt the sea as well as fresh waters, and are very expert divers, whence they are popularly called *Dippers* in this country. They feed on fishes, frogs, crustacea, and insects. There are several species very widely distributed.

The GREAT CRESTED GREBE, *P. cristatus*, twenty-one inches long, is found in Europe and North America: in this country it is usually met with in secluded ponds and lakes in the interior.

The RED-NECKED GREBE, *P. rubricollis*, is sixteen and a half inches long; found in Europe and North America; a rare species, however.

The SCLAVONIAN or HORNED GREBE, *P. cornutus*, is fourteen inches long; common to both Europe and America. In this country it is known by the various expressive titles of *Dipper*, *Water-Witch*, and *Hell-Diver*.

The EARED GREBE, *P. auritus*, is twelve inches long, and is found in Europe and parts of North America.

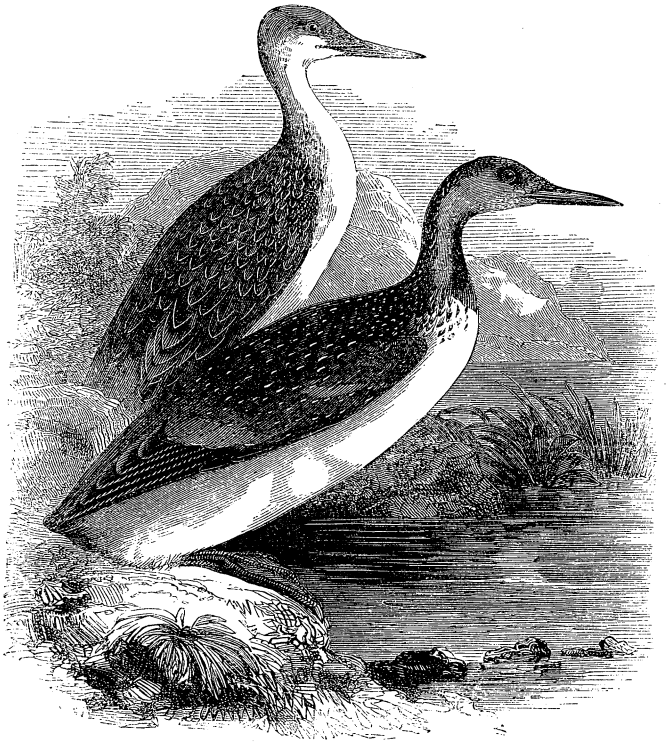
The LITTLE GREBE, DOBCHICK, or DABCHICK, *P. minor*, is nine and a half inches long; common in Europe.

The PIED DABCHICK or DIPPER, *P. Carolinensis*, is thirteen and a half inches long, and is peculiar to North America.

Genus COLYMBUS: *Colymbus*.—This includes several remarkable species called *Divers*,

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living chiefly at sea, and diving with great ease, and remaining for a long time under water. During the breeding season they frequent islands and interior lakes and pools of fresh water, where they make their nests among reeds and flags some thirty or forty yards from the water's edge. The eggs are two to three. Their wings are short, but their flight is strong and rapid. They prefer, however, to dive rather than take wing. Their legs are placed so far behind that they cannot walk upon them; still they shove themselves along on the ground by jerks, rubbing the breast on the ground. They make a regular path from the water to their nests.



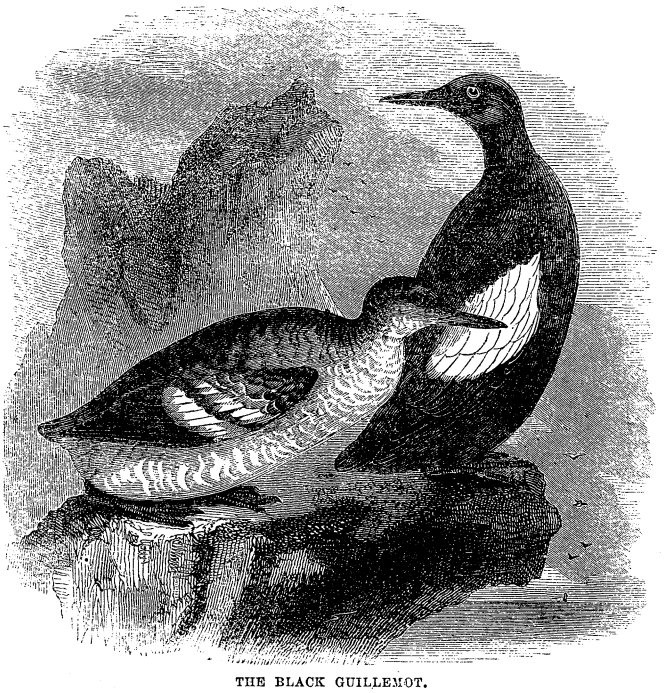
THE RED-THROATED DIVER.

The Great Northern Diver or Loon, *C. glacialis*, thirty-two inches long; ranges from 28° to 70° north latitude, and is common to both Europe and America. (See p. 303.)

The Black-throated Diver, *C. arcticus*, is twenty-nine inches long; found in Europe and America.

The Red-throated Diver, *C. septentrionalis*, twenty-four inches long, is common in Europe and America. This is called *Scape-Grace* on our coast.

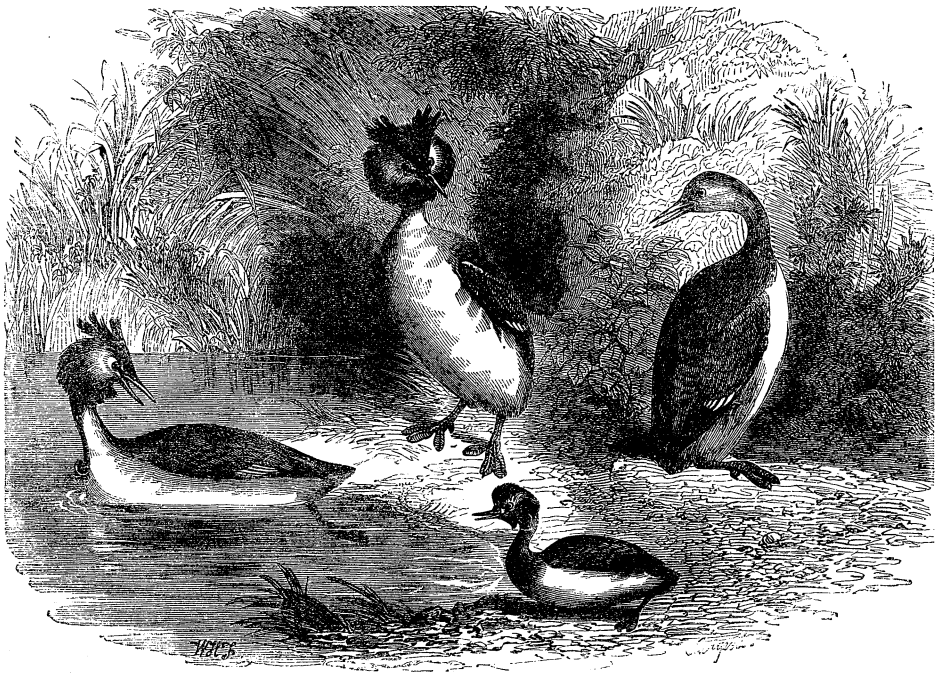
Genus URIA: *Uria.*—This includes the *Guillemots*, resembling the divers: they are oceanic birds, and swim and dive well, and thus are able to secure the small fishes and crustacea on which they feed.



THE BLACK GUILLEMOT.

The Common Guillemot, *U. troile*—the *Willock* or *Tinker-shere* of England—is eighteen inches long; lays a single egg, those of different birds differing in color; found in the northern regions of Europe and America. According to Yarrell this is the *Foolish Guillemot* of Pennant and others, so called because it allows itself to be taken by the hand in the breeding season; it is the *Murre* of De Kay and Nuttall.

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GREBES. (See p. 327.)

The BLACK GUILLEMOT, *U. grylle*, is thirteen inches long; found in the arctic regions of Europe and America; is occasionally met with on our coast.

The THICK-BILLED or BRUNNICH'S GUILLEMOT, *U. Brunnichii*, eighteen inches long; found in northern regions of Europe and America. This is according to Yarrell; the Smithsonian Catalogue makes two distinct species, the *Thick-billed* and *Brunnich's*, and calls the latter the *Murre*.

The RINGED or BRIDLED GUILLEMOT, *U. lacrymans*, is eighteen inches long; found in Europe.

THE ALCADÆ.

These consist of the *Auks* and *Puffins* of the Arctic Seas, and the *Penguins* of the Antarctic Seas: they have the feet placed very far back, close to the hinder extremity of the body, which adapts them admirably for swimming. They do not support themselves when on land merely upon the toes, as is the case with most other birds, but upon the whole lower surface of the tarsus, which is usually furnished with a sort of sole to adapt it for this purpose. The wings are very small, sometimes, as in the Penguins and the Great Auk, rudimentary, and covered only with a scaly skin; in other cases they are covered with feathers and furnished with quills, so that the birds are capable of rising into the air, although their flight is by no means powerful. The beak is compressed and short, sometimes hooked at the tip, and the plumage is exceedingly thick and close.

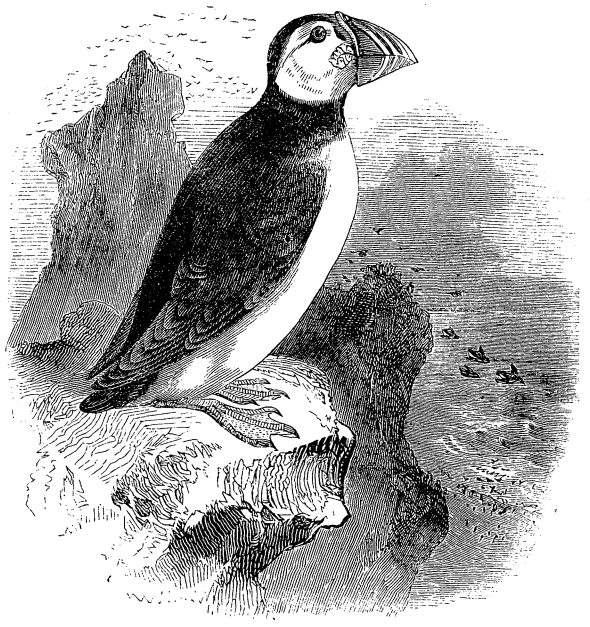
Genus FRATERCULA: *Fratercula.*—This includes the ARCTIC PUFFIN, *F. arctica*—*Moine* and *Perroquet du Nord* of the French—twelve inches long; it flies with facility, is migratory, feeds on young fish, marine crustacea, and insects; lays one egg in a crevice in the rocks, or in a burrow three feet deep, which it digs in the earth; found along the rocky coasts of Europe and America. This is the *Sea-Parrot* and *Coulter-Neb* of English authors, and the *Mormon arcticus* of Illiger.

Other species are the COMMON PUFFIN, *Mormon glacialis* of Leach; the HORNED PUFFIN, *M. corniculatus* of Naumann, and the TUFTED PUFFIN, *M. cirrhatus* of Bonaparte.

Genus ALCA: *Alca.*—This includes the GREAT AUK, *A. impennis*, thirty-two inches long; it feeds on fish; builds in the crevices of rocks; lays one egg the size of a swan's. The wings are little more than fins, and do not enable the bird to fly, but they are very efficient as oars in swimming. It is found along the shores of the Arctic Seas; occasionally on the coasts of England.

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The Common Auk or Razor-Bill—the *Murre* of the English Cyclopedia of Natural History—*A. torda*, is fifteen inches long; lays one egg the size of that of a turkey. Its wings are tolerably well developed, and are used for flight, as well as for progression when the bird is under water. It swarms in the high regions of the Atlantic and Pacific, and is common along the rocky coasts of Great Britain. Ray says: "It lays, sits, and brings up its young on the ledges of the craggy cliffs and steep rocks by the sea-shores, that are broken and divided into many, as it were, stairs or shelves, together with the coulter-nebs and guillemots. The Manksmen are wont to compare these rocks, with the birds sitting upon them in breeding time, to an apothecary's shop—the ledges of the rocks resembling the shelves, and the birds the pots. About the Isle of Man are very high cliffs broken in this manner into many ledges, one above another, from top to bottom. They are wont to let down men by ropes from the tops of the cliffs to take away the eggs and young ones. They take also the birds themselves when they are sitting upon their eggs, with snares fastened to the ends of long poles, and put about the necks of the birds. They build no nests, but lay their eggs upon the bare rocks."



THE ARCTIC PUFFIN.

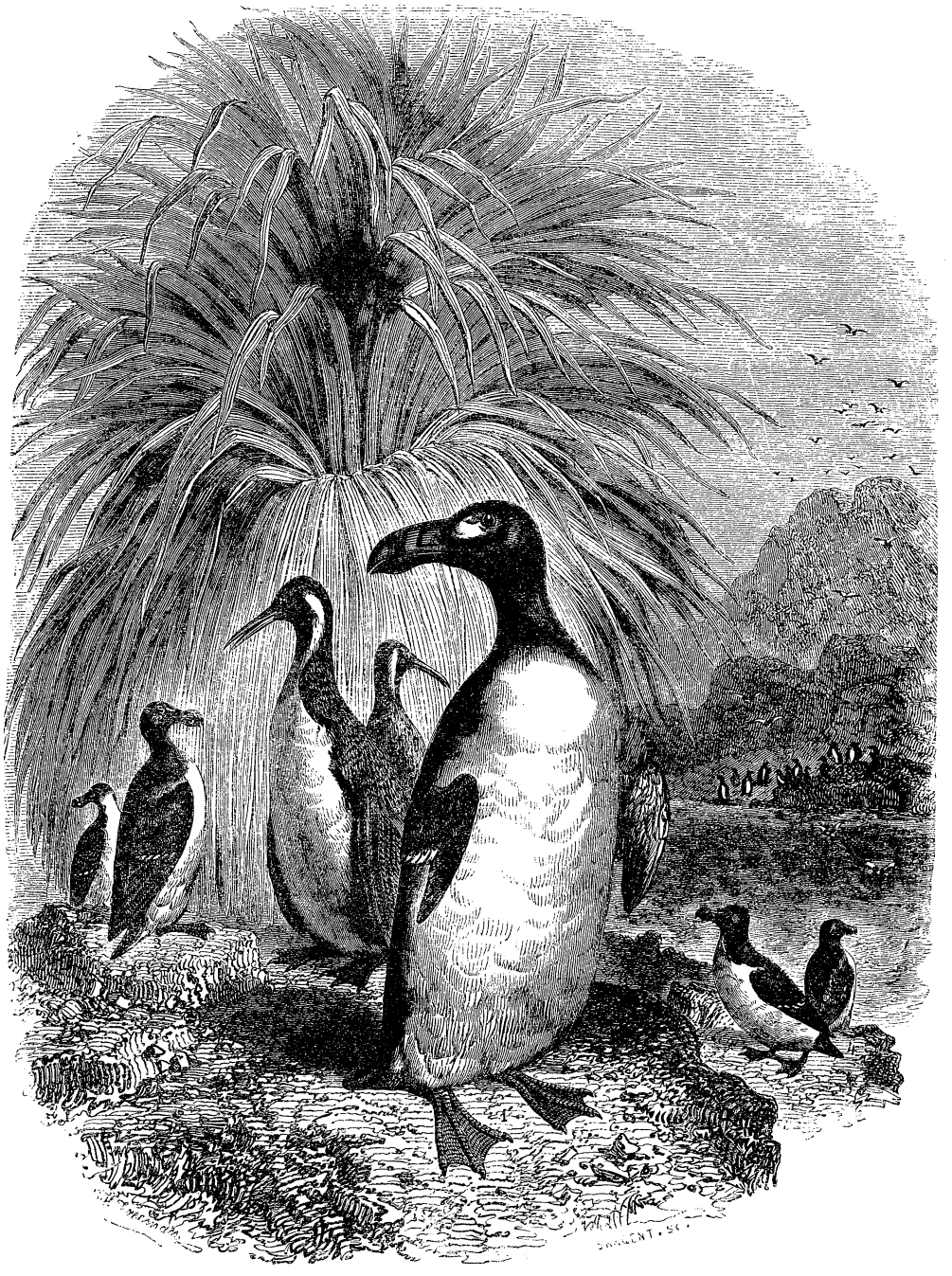
The gathering of the eggs of sea-fowl, as well as the birds themselves for their feathers, along the steepling rocks of the Hebrides, the Shetlands, and the Orkneys, and other places around the British Islands, in which the adventurous fowlers are swung over the cliffs, five hundred or a thousand feet above the waves, has often been described as one of the most perilous of human pursuits. Nuttall, speaking of the multitudes of auks on the Isle of Wight, says: "The eggs being esteemed a delicacy, particularly for salads, the fishermen and other indigent and adventurous inhabitants traverse the precipices in search of them. Some of these stupendous cliffs are six hundred feet above the yawning deep which lashes and frets them into gloomy caverns. Seaward they present rugged and deeply indented cliffs, on whose rude shelvings and ledges the birds arrange themselves by thousands, and without further preparation lay their eggs, which lie as it were strewed without precaution by hundreds in a row, no way attached or defended by the rocks, so that in a gale of wind whole ranks of them are swept into the sea. To these otherwise inaccessible deposits, the dauntless fowlers ascend, and passing intrepidly from rock to rock, collect the eggs, and descend with the same indifference. In most places, however, the attempt is made from above. The adventurer is let down from the slope contiguous to the brink of the cliff by a rope, sustained by a single assistant, who, lowering his companion, depends on his personal strength alone to support him, which, if failing, the fowler is dashed to pieces, or drowned in the sea which roars and heaves below."

A similar scene near the coast of Dover is thus graphically described by Shakspeare:

"——How fearful
And dizzy 'tis to cast one's eyes so low!
The crows and choughs that wing the midway air
Show scarce so gross as beetles! Half way down
Hangs one that gathers samphire, dreadful trade!
Methinks he seems no bigger than his head;
The fishermen that walk upon the beach
Appear like mice; and yon tall anchoring bark
Diminished to her cock; her cock a buoy
Almost too small for sight. The murmuring surge,
That on the unnumber'd idle pebbles chafes,
Cannot be heard so high. I'll look no more,
Lest my brain turn, and the deficient sight
Topple down headlong."

The Little Auk, *A. alle* of Linnæus, *Mergulus melanoleucos* of Ray, is ten inches long, and in-

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GREAT AUK, RAZOR-BILLS, AND PUFFINS.

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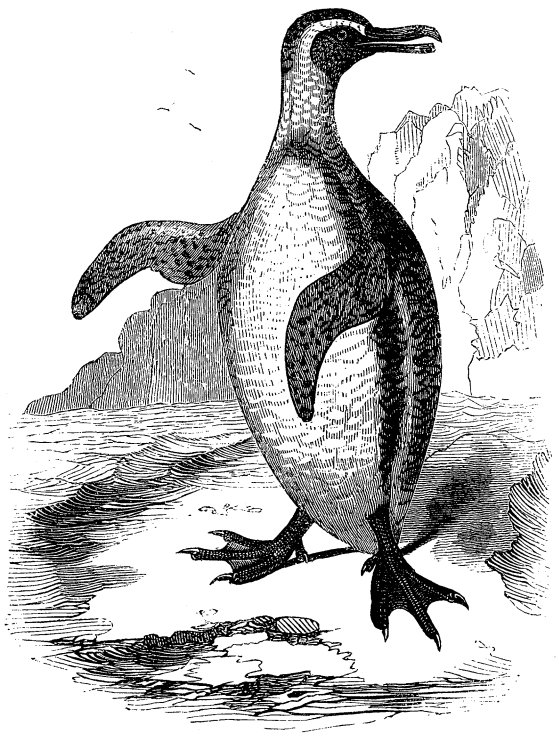
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habits the northern seas. It has the various popular names of *Dove Kie*, *Sea-Dove*, *Sea-Pigeon*, *Greenland Dove*, *Pigeon-Diver*, and *Ice-Bird*.

The PERROQUET AUK, *A. psittacula*, is eleven inches long, and abounds along the coast of Kamtschatka. It is said that they are so little suspicious, that the natives place a dress with large sleeves near their holes, into which the birds run, mistaking them for their burrows, and are thus entrapped. This and the preceding fly, dive, and swim with facility.

The *Penguins—Manchots* of the French—resemble the auks, but the feathers of their wings are rudimentary, and covered with skin, so that they are like fins. These are very useful in swimming, but do not enable the birds to fly. There are several species, abounding in the Antarctic Seas, where they pass the greater portion of their time in the water, and appear rarely to stay any time on land, except during the breeding season. In the water they are exceedingly active, swimming and diving with the greatest facility, and making use of their little naked wings as fins, when engaged in the latter operation. When in motion on land, however, they employ these in place of an anterior pair of legs; and by their assistance contrive to scuttle along so rapidly that when they are in motion among the tussocks of grass, they might readily be mistaken for quadrupeds. They do not appear to have very acute sensations; Sparman tells us that he stumbled over a sleeping one and kicked it several yards without disturbing its rest. Forster says that he left several of them apparently lifeless while he went in pursuit of others, but they afterward got up and marched off with their usual gravity. They hatch their eggs by holding them between their thighs, and when threatened with danger, move away, still retaining them in this position. During the period of incubation the male fishes for the female, and after the young are hatched both parents are engaged for a time in procuring their food.

Genus EUDYPTES: *Eudyptes.*—This includes the CRESTED PENGUIN, *E. chrysocome*—the *Manchot Sauteur* of Buffon—size of a duck; it has a tuft of sulphur-colored feathers on the sides of its head. It leaps four or five feet out of water and then falls upon its prey. This is the *Gorfou Sauteur* of Le Maout; found in the Antarctic Seas.



THE JACKASS PENGUIN.

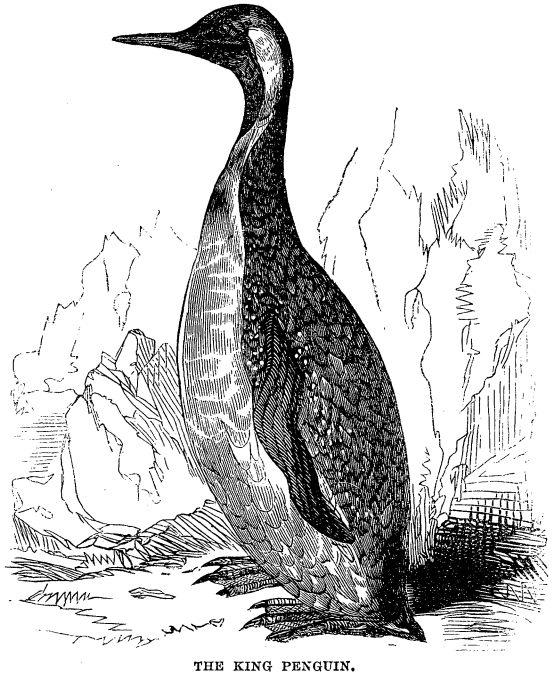
Genus APTENODYTES: *Aptenodytes*, includes the JACKASS PENGUIN, *A. demersa*, of which Mr. Darwin gives the following pleasant account, the scene of the adventure being the Falkland Islands, where these birds abound: "One day, having placed myself between one of these penguins and the water, I was much amused by watching its habits. It was a brave bird, and, till reaching the sea, it regularly fought and drove me backward. Nothing less than heavy blows would have stopped him; every inch gained he firmly kept, standing close before me, erect and determined. When thus opposed, he continually rolled his head from side to side, in a very odd manner, as if the power of vision only lay in the anterior and basal part of each eye. This bird is commonly called the *Jackass Penguin*, from its habit, while on shore, of throwing its head backward, and making a loud, strange noise, very like the braying of that animal; but while at sea and undisturbed, its note is very deep and solemn, and is often heard in the night-time. In diving, its little plumeless wings are used as fins; but on the land as front-legs. When crawling—it may be said on four legs—through the tus-

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socks, or on the side of a grassy cliff, it moved so very quickly that it might readily have been mistaken for a quadruped. When at sea, and fishing, it comes to the surface, for the purpose of breathing, with such a spring, and dives again so instantaneously, that I defy any one at first sight to be sure that it is not a fish leaping for sport."

The following interesting account, probably referring to this species, is furnished by Captain Fitzroy. He is speaking of Noir Island: "Multitudes of Penguins were swarming together in some parts of the island, among the bushes and tussocks near the shore, having gone there for the purpose of moulting and rearing their young. They were very valiant in self-defense, and ran open-mouthed, by dozens, at any one who invaded their territory, little knowing how soon a stick would scatter them on the ground. The young were good eating, but the others proved to be black and tough when cooked. The manner in which they feed their young is curious and rather amusing. The old bird gets on a little eminence and makes a great noise, between quacking and braying, holding its head up in the air, as if it were haranguing the penguinnery, while the young one stands close to it, but a little lower. The old bird, having continued its clatter for about a minute, puts its head down and opens its mouth widely, into which the young one thrusts its head, and then appears to suck from the throat of its mother for a minute or two, after which the clatter is repeated, and the young one is again fed; this continues for about ten minutes. I observed some which were moulting make the same noise, and then apparently swallow what they thus supplied themselves with; so in this way, I suppose, they are furnished with subsistence during the time they cannot seek it in the water."

The KING PENGUIN or PATAGONIAN PENGUIN, *A. Patachonica*, is over three feet long; slaty-black above, with white, satin-like feathers on the breast. It appears to be very abundant on the Straits of Magellan, the coasts of Patagonia, Terra del Fuego, Falkland Islands, &c. Sir John Narborough says that their erect attitude and bluish-black backs, contrasted with their white bellies, might cause them to be taken at a distance for young children with white bibs. The towns, camps, and rookeries, as they have been called, of these birds, have proved an ample theme for most of the southern voyagers. Those at the Falkland Islands have attracted particular attention. Some of these assemblies are described as giving a dreary, not to say awful impression of the desolation of the place, and the utter absence of the human race. In some of the towns, it is stated, there was a general stillness, and when the intruders walked among the feathered population, to provide themselves with eggs, they were regarded with side-long glances, but they seemed to carry no terror with them. In many places the shores are covered with these birds, and three hundred have been taken within an hour; for they generally make no effort to escape, but stand quietly by, while their companions are knocked down with sticks till it comes to their turn. Cook, speaking of two islands in the high latitudes of the south, describes the cold as intense; the islands were covered with hoar-frost and snow, neither trees nor shrubs appeared, and he saw no living creature except the shags and penguins, the last being so numerous that they seemed to encrust the rock.



THE KING PENGUIN.

Some describe the rookeries as designed with the utmost order and regularity, though they are the resort of several different species. A regular camp, often covering three or four acres, is laid

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out and leveled, and the ground disposed in squares for the nests, as accurately as if a surveyor had been employed. Their marchings and countermarchings are said to remind the observer of the maneuvers of soldiers on parade. In the midst of this apparent order, there appears to be, according to the same accounts, not very good government, for the stronger species steal the eggs of the weaker, if they are left unguarded, and the King Penguin is the greatest thief of all.

But the dimensions of those rookeries we have noticed, sink into insignificance when compared with a settlement of the King Penguins recorded by Mr. G. Bennett, who saw at the north end of Macquarrie Island, in the South Pacific Ocean, a colony of these birds which covered an extent of thirty or forty acres. He describes the number of penguins collected together in this spot as immense; but observes that it would be almost impossible to guess at it with any near approach to truth, as, during the whole of the day and night, thirty or forty thousand are continually landing, and an equal number going to sea. "They are arranged, when on shore, in as compact a manner, and in as regular ranks as a regiment of soldiers; and are classed with the greatest order, the young birds being in one situation, the moulting birds in another, the sitting hens in a third, the clean birds in a fourth, &c.; and so strictly do birds in similar conditions congregate, that should a bird that is moulting intrude itself among those which are clean, it is immediately ejected from them. The females hatch the eggs by keeping them close between their thighs, and if approached during the time of incubation, move away, carrying their eggs with them. At this time the male bird goes to sea and collects food for the female, which becomes very fat. After the young is hatched, both parents go to sea, and bring home food for it; it soon becomes so fat as scarcely to be able to walk, the old birds getting very thin. They sit quite upright in their roosting places, and walk in the erect position until they arrive at the beach, when they throw themselves on their breasts, in order to encounter the very heavy sea met with at their landing-place."

There are still some other species.

THE PELECANIDÆ.

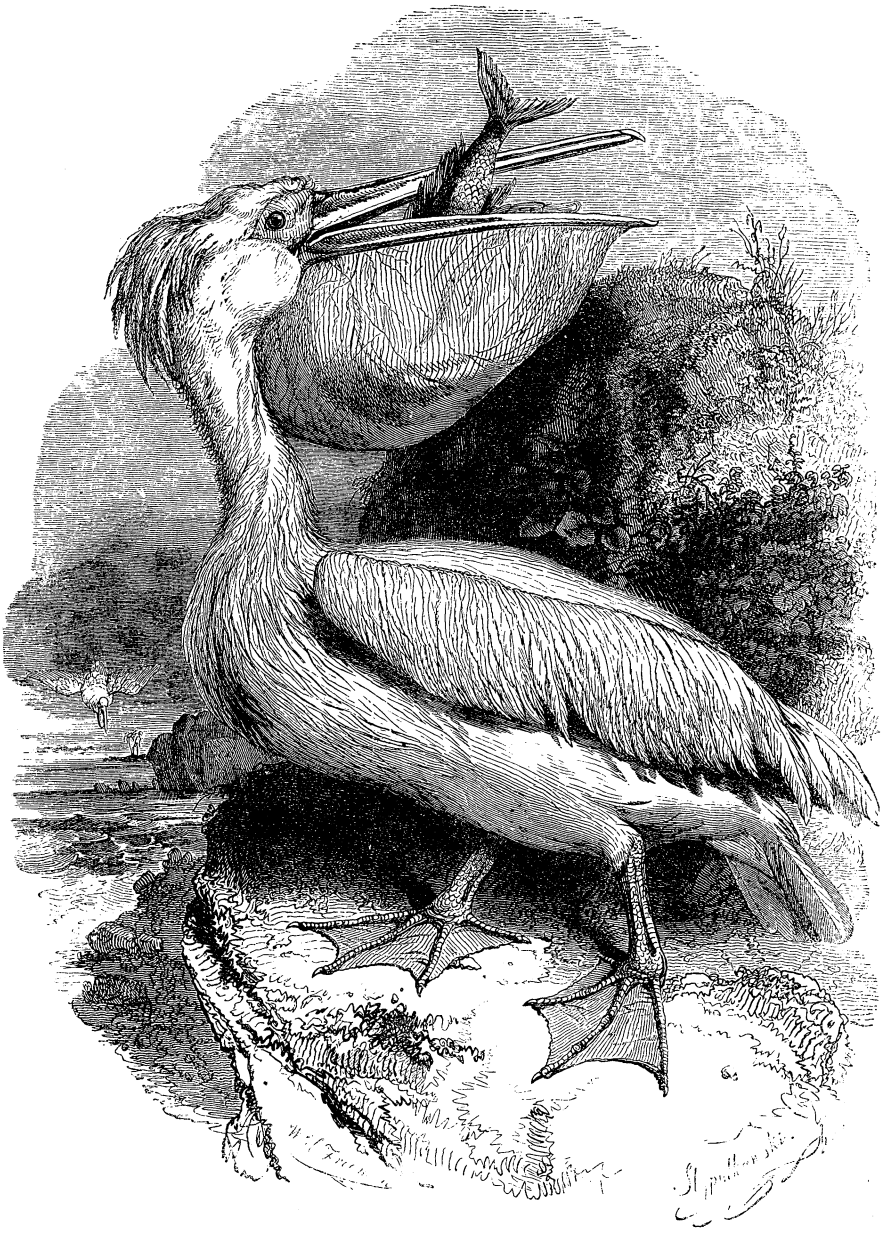
This family includes several large birds of powerful organization, and voracious appetites, feeding entirely on fishes, which they capture in various ways.

THE TRUE PELICANS.

Genus PELECANUS: *Pelecanus.*—The birds of this genus are large and heavy, with immense extent of wing, and are excellent swimmers. The expansive pouch, whose elasticity is well known to all who have witnessed the shapes into which it is stretched and formed by the itinerant showman, will hold a considerable number of fish, and thus enables the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. In feeding the nestlings—and the male is said to supply the wants of the female when sitting, in the same manner—the under mandible is pressed against the neck and breast, to assist the bird in disgorging the contents of the capacious pouch; and during this action the red nail of the upper mandible would appear to come in contact with the breast; thus laying the foundation, in all probability, for the fable that the pelican nourished her young with her blood, and for the attitude in which the imagination of painters has placed this bird in books of emblems, &c., with the blood spirting from the wounds made by the terminating nail of the upper mandible into the gaping mouths of her offspring.

The neighborhood of rivers, lakes, and the sea-coasts, are the haunts of the Pelicans, and they are rarely seen farther than twenty leagues from the land. They appear to be to a certain extent gregarious. Levaillant, upon visiting Dassen-Eyland, where was the tomb of a Danish captain, at the entrance of Saldanha Bay, beheld, as he says, after wading through the surf and clambering up the rocks, such a spectacle as perhaps never before appeared to the eye of mortal. "All of a sudden there arose from the whole surface of the island, an impenetrable cloud, which formed, at the distance of forty feet above our heads, an immense canopy, or rather a sky, composed of birds of every species, and of all colors—cormorants, sea-gulls, sea-swallows, pelicans, and I believe the whole winged tribe of this part of Africa were here assembled. All their voices, mixed together

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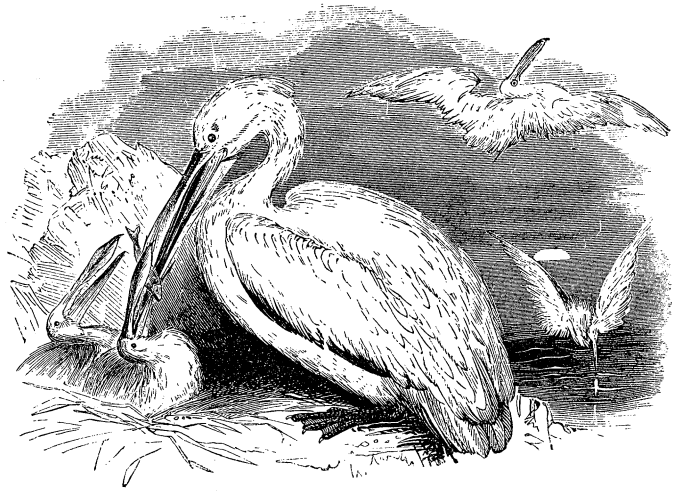
THE COMMON WHITE PELICAN.

and modified according to their different kinds, formed such a horrid music that I was every moment obliged to cover my head to give a little relief to my ears. The alarm which we spread was so much the more general among these innumerable legions of birds, as we principally disturbed the females which were then sitting. They had nests, eggs, and young to defend. They were like furious harpies let loose against us, and their cries rendered us almost deaf. They often flew so near us that they flapped their wings in our faces, and though we fired our pieces repeatedly we were not able to frighten them; it seemed almost impossible to disperse this cloud. We could not move one step without crushing either their eggs or their young ones; the earth was entirely strewed with them." The same traveler found on the Klein-Brak River, while waiting

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for the ebb-tide, thousands of pelicans and flamingoes, the deep rose-color of the one strongly contrasting with the white of the other.

The subject of Montgomery's beautiful poem, "The Pelican Island," was suggested by a short passage in Captain Flinder's voyage to Terra Australis, in which he describes one of those numerous gulfs which indent the coast of New Holland, and are thickly spotted with small islands. "Upon two of these," he says, "we found many young pelicans unable to fly. Flocks of the old birds were sitting upon the beaches of the lagoon, and it appeared that the islands were their breeding-places; not only so, but from the number of skeletons and bones there scattered, it should seem that, for ages, these had been selected as the closing scene of their existence. Certainly none more likely to be free from disturbance of every kind could have been chosen, than these islets of a hidden lagoon of an uninhabited island, situate upon an unknown coast, near the antipodes of Europe; nor can any thing be more consonant to their feelings, if pelicans have any, than quietly to resign their breath, surrounded by their progeny, and in the same spot where they first drew it."



THE PELICAN FEEDING HER YOUNG.

The following is one of the poet's pictures of the training of the young:

"On beetling rocks the little ones were marshall'd;
There by endearments, stripes, example, urged
To try the void convexity of heaven,
And plough the ocean's horizontal field.
Timorous, at first they fluttered round the verge,
Balanced and furled their hesitating wings,
Then put them forth again with steadier aim;
Now, gaining courage as they felt the wind
Dilate their feathers, fill their airy frames
With buoyancy that bore them from their feet,
They yielded all their burthen to the breeze,
And sailed and soared where'er their guardians led.
Ascending, hovering, wheeling, or alighting,
They searched the deep in quest of nobler game
Than yet their inexperience had encountered:
With these they battled in that element,
Where wings or fins were equally at home,
Till conquerors in many a desperate strife,
They dragged their spoils to land, and gorged at leisure."

Another picture, from the same graphic pen, may well be added:

"Day by day,
New lessons, exercises, and amusements
Employed the old to teach, the young to learn.
Now floating on the blue lagoon behold them,
The sire and dam in swan-like beauty steering,
Their cygnets following through the foaming wake,
Picking the leaves of plants, pursuing insects,
Or catching at the bubbles as they brake;
Till on some minor fry, in reedy shallows,
With flapping pinions and unsparing beaks,
The well-taught scholars plied their double art,
To fish in troubled waters, and secure
The petty captives in their maiden pouches;
Then hurry with their banquet to the shore,
With feet, wings, breast, half-swimming and half-flying;
And when their pens grew strong to fight the storm,
And buffet with the breakers on the reef,
The parents put them to severer proofs."

The Common White Pelican, *P. onocrotalus*, is from five to six feet long, with twelve to thirteen expanse of wing, this being the largest of web-footed birds. The color is white, tinged with rose or salmon color. The nest is formed of coarse reedy grass; the eggs are white, and two to five in number. This bird is very widely distributed; it is found in the Oriental countries of Europe; is common on the rivers and lakes of Hungary and Russia; tolerably abundant on the Danube; rare and accidental on the sea-coast. Belon, who refers to Leviticus (xi. 18), where the bird is noted as unclean, says that it is frequent on the lakes of Egypt and Judæa. When he was passing the plain of Roma, which is only half a day's journey from Jerusalem, he saw them flying in

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pairs like swans above his head, rather low; and adds that they are also seen flying in large flocks like those birds. Hasselquist saw it at Damietta in Egypt. He also adds, in his chapter on the arrival there of migrating birds, that it comes to Egypt in the middle of September. "In flying," says he, "they form an acute angle, like the common wild geese when they migrate. In the summer they inhabit the Black Sea and coasts of Greece; and in their migration remain for a few days near Smyrna and other parts of the coasts of Natolia, but never stray far from the continent; they fly very high. Some of them remain at Damietta, and in the islands of the Delta in the Mediterranean, but the greater part go to Egypt." They appear in some of the Egyptian drawings on the ancient monuments.

The American Pelican, *P. erythrorhynchus*, held by many to be identical with the preceding, and greatly resembling it, is found in various parts of America, in Florida, Louisiana, Mississippi, Missouri, Utah, California, the West Indies, the isthmus of Panama, &c. In the Fur Countries it is met with up to latitude 61° north, but is seldom found within two hundred miles of the sea-coast. They deposit their eggs usually on small rocky islands in lakes and rivers, or on the banks of cascades where they can scarcely be approached, but still are by no means shy. They live together generally in flocks of from six to fourteen, and fly low and heavily, sometimes abreast, at others in an oblique line; and they are often seen to pass close over a building, or within a few yards of a party of men, without exhibiting any signs of fear. For the purpose of surprising their prey, they haunt eddies near water-falls, and devour great quantities of carp and other fish. They can only swallow, apparently, when opening the mouth sideways and somewhat upward like the shark. When surfeited with food, they doze on the water, or on some sand-shoal projecting into or surrounded by it, where they remain a great part of their time in gluttonous inactivity digesting their overgorging meal. At such times they may be easily captured, as they have then great difficulty in starting into flight, particularly if the pouch is loaded with fish. They sometimes, though rarely, perch on trees.

The Brown Pelican, *P. fuscus*, is smaller than the preceding, being about four feet long, and confined exclusively to the warmer parts of the coast of America, being common in the Southern States, Mexico, and the West Indies, and the northern parts of the continent of South America. Its habits are similar to those of the preceding.

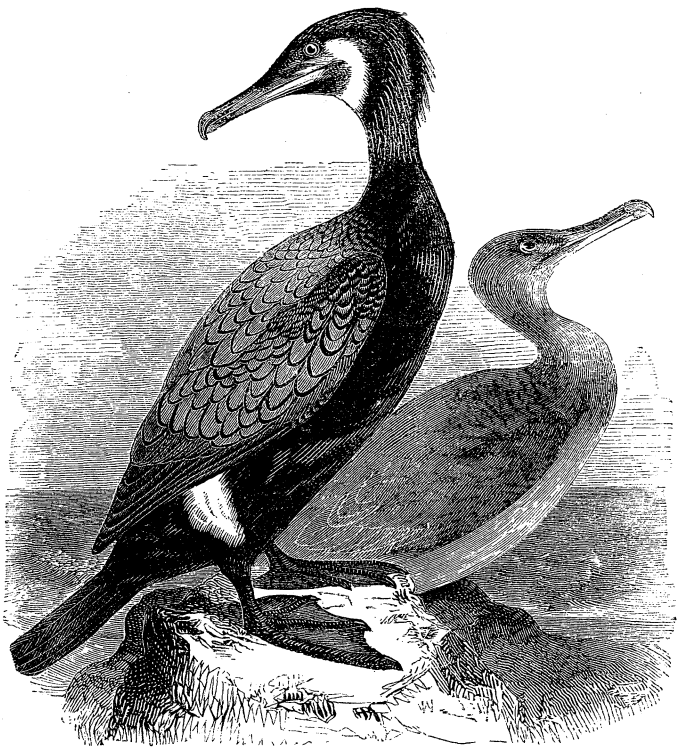
There are some other species, all resembling those we have described, in their habits.

CORMORANTS, GANNETS, FRIGATE BIRDS, TROPIC BIRDS, ETC.

The Cormorants are large, greedy, and powerful water birds, widely distributed over the globe. They are usually found at sea, yet frequently in the neighborhood of fresh waters, and feed upon mollusca and fishes, especially eels, which they pursue under water with the greatest activity. They fly well, and often perch and make their nests on trees; but the nest is also frequently constructed on the ground or in the holes of rocks, according to the situations inhabited by the birds. When fishing, they often rise to the surface with the fish across the bill, throw it up into the air, and catch it again with the head foremost, so as to swallow it with greater facility. According to Mr. Waterton, the struggle between a cormorant and a large eel often lasts a considerable time before the bird can dispose comfortably of its prey. After the eel has been got down for the first time, it frequently struggles violently to release itself from its disagreeable quarters, and continues to wriggle up backward until a considerable portion of its tail is visible at the cormorant's mouth; and this process may be repeated two or three times before the victim becomes so exhausted as to submit quietly to its fate. In some cases, however, it appears that when the cormorant finds his prey is so large as to threaten to be troublesome, he takes the precaution to disable it, by taking it to the shore and beating it about with his bill.

Genus PHALACROCORAX: *Phalacrocorax*.—To this belongs the Common or Black Cormorant, *P. carbo*—*Graculus carbo* of Gray—size of a goose; three feet long. The nests are made of sticks, sea-weed, grass, and other coarse materials, sometimes on the banks of rivers, and sometimes on trees. It is common on the shores of Greenland, where the natives make use of its tough skin for garments, and of its pouch as floats for their fishing tackle. It is also found along the coasts of Europe, Asia, and those of America from Baffin's Bay to the Carolinas. It is a most dextrous

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THE BLACK CORMORANT.

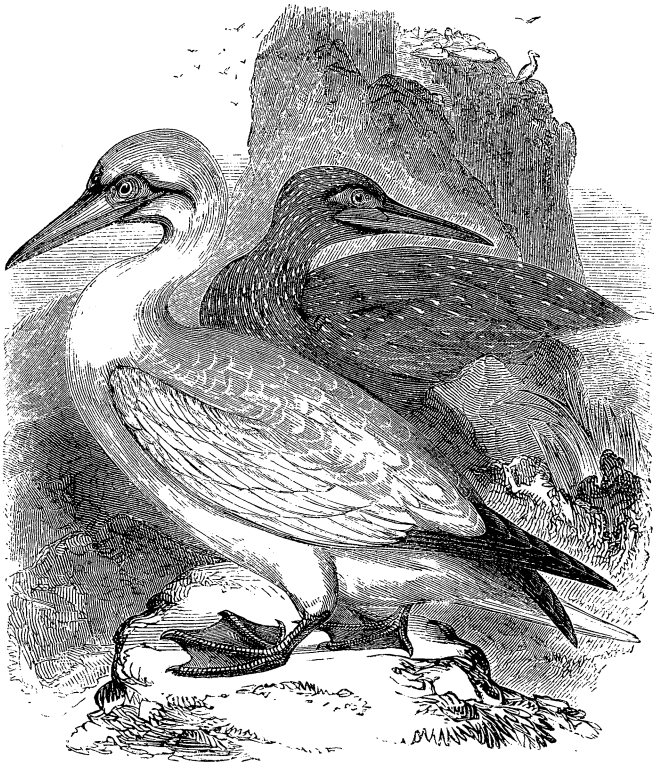
and voracious fisher. In some countries, as in China, and formerly in England, the skill of the cormorant in fishing was turned to profit; for by buckling a ring about the lower part of the neck, to prevent deglutition, and accustoming it to return with its acquisitions in the bill to its master, it was made a useful and domestic fisher. On the rivers of China, cormorants, though of a different but very similar species, *P. Sinenis*, thus arranged, are perched on the prows of boats, and at a signal made by striking the water with an oar, they instantly plunge, and soon emerge with a fish, which is taken from them; and this toil continued till its master is satisfied, he looses the collar, and finishes the day by allowing it to fish for itself. But it is only hunger which gives activity to the cormorant; when glutted with its meal, which is soon acquired, it relaxes into its native indolence, and dozes away the greatest part of its time in gluttonous inebriety, perched in solitude on naked and insulated or inaccessible rocks, to which it prudently retires for greater safety from the intrusion of enemies.

Another common species is the SHAG or GREEN CORMORANT, *P. graculus;* it is twenty-seven inches long; chiefly frequents the sea, and has been caught in a crab-pot one hundred and twenty feet below the surface of the water. Its habits and distribution are similar to those of the Black Cormorant.

The following species are noted in the Catalogue of the Smithsonian Institution: PALLAS'S CORMORANT, *Graculus perspicillatus:* DOUBLE-CRESTED CORMORANT, *G. dilophus:* FLORIDA CORMORANT, *G. Floridanus:* MEXICAN CORMORANT, *G. Mexicanus:* BRANDT'S CORMORANT, *G. penicillatus;* VIOLET-GREEN CORMORANT, *G. violaceus:* the TUFTED CORMORANT, *G. Cincinnatus;* all found on some parts of the coasts of North America.

Genus SULA: *Sula.*—This includes the *Gannets*, which resemble the cormorants in their form and their voracity. The COMMON GANNET, *S. alba*—called the *Channel-Goose* and also *Soland* or *Solan-Goose*, a corruption of *Solent*—the name of the narrow sea between the Isle of Wight and the main-land of England, where this species is common—rarely swims much, and is quite incapable of diving. These birds take the fishes of which their prey consists, by flying over the sur-

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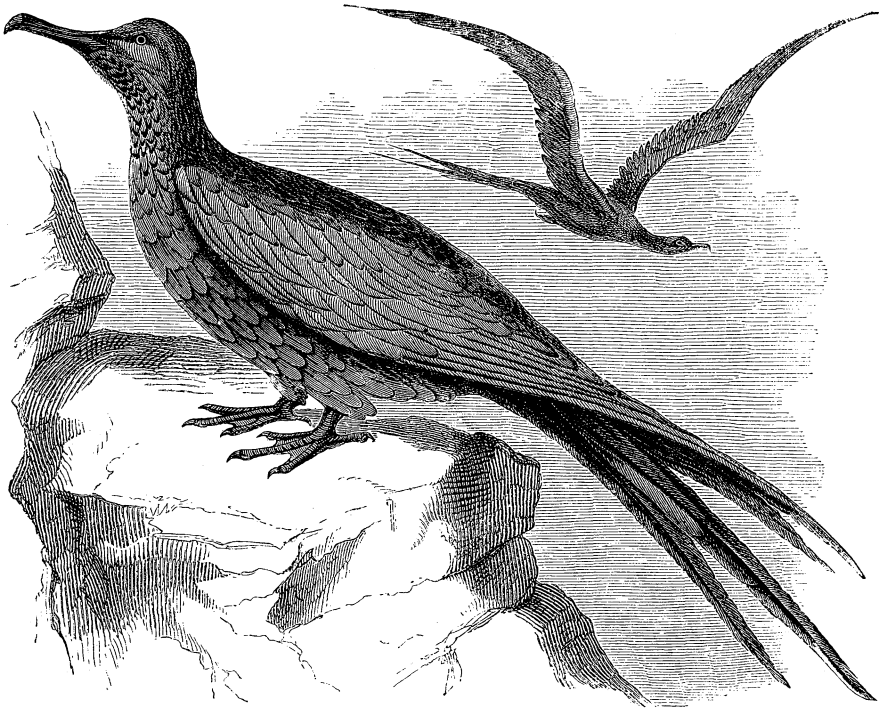
THE SOLAND GOOSE.

face of the sea, and plunging suddenly down upon any that come within sight. They are constant attendants upon the shoals of herrings and pilchards, and, by their movements, often give the fishermen notice of the approach of these fishes, and of the direction in which they are proceeding. They form a nest with grass and sea-weeds upon the rocks, and lay a single egg. The young birds are taken in considerable numbers in England and Scotland, and sold for food. The average number taken annually from the Bass Rock—at the mouth of the Frith of Forth, in the northeast of Scotland—is from fifteen to sixteen hundred, and these are sold at from eighteen to forty cents each. The general color is white; the young birds are covered with a beautiful white down, which is said to be quite equal to swans' down for the manufacture of tippets, &c. The adult Gannets attain a length of more than three feet, but they are not used for food, and their capture is undertaken solely for the sake of the feathers. They are frequently caught by laying a herring upon a board, and dragging this along behind a boat; the Gannets, seeing the fish, plunge down upon it, and either break their necks by the shock, or strike their bills fairly through the board. This species is also found on the Atlantic coast of North America. It is sometimes called the *Booby*, from the ease with which it may be approached, and even captured, when sitting. The French call it *Fou* and *Boubie*. Another species called the Booby Gannet, *S. fiber*, is found in the South Atlantic and along the Gulf coast of the United States.

Genus TACHYPETES: *Tachypetes*.—Among the most remarkable birds of this family is the Frigate-Bird, Man-of-War-Bird, or Frigate-Pelican, *T. aquilus*, noted for its extraordinary powers of flight. The tail is long and forked; the feet small, the webs deeply notched; the whole length three feet; the eggs one or two. The wings are narrow and of immense length, having an expanse of from ten to twelve feet. These birds not only shoot through the air with great velocity, but fly to an immense distance from the land. They are very abundant on the coasts of tropical America, where they may be seen sailing along at a considerable height above the surface of the waves, and occasionally darting down with the rapidity of lightning upon any fish that

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comes in sight; it also attacks the boobies and other marine birds with such violence that they are glad to yield their prey to their active assailant, and make their escape.



THE MAN-OF-WAR BIRD.

"The Frigate-Pelicans," says Nuttall, "associate in small or large flocks; keep much on the wing, encountering storms with impunity, and soaring at times above the clouds. They fly with great rapidity, and are seen far out at sea, though never resting on the surface, as they appear unable either to dive or swim. On land they are seen perched on trees, or on high rocks; and when on the ground appear unable to rise, and are easily caught. They pursue the flying-fish, and seize it as it rises from the waves to escape from its pursuers in the deep. Tyrants of the ocean, they even seize upon the Pelican, and habitually harass the Gulls and Boobies, compelling them often to drop their finny prey, or even to disgorge that which they have swallowed, and are so eager and alert in the pursuit, as to seize the fish before it arrives at the waves. Their sight, like that of the Eagle, is keen and accurate, and they are often seen to pounce upon their quarry from the sky with an unerring aim. They sometimes skim the surface of the waves, or lie suspended with their wings still elevated above the back.

"The Frigate Pelican, or Man-of-War Bird, is chiefly seen on the tropical seas, and generally on the wing. They are abundant in the Island of Ascension, India, Ceylon and China. In the South Sea they are seen about the Marquesas, Easter Isles and New Caledonia, also at Otaheite. Dampier saw them in great plenty in the island of Aves in the West Indies, and they are common off the coast of East Florida, particularly around the reefs or keys, often assembled in flocks of from fifty to a thousand. They are also not uncommon, during summer, along the coasts of the Union as far as South Carolina, and breed in various places, retiring to warmer latitudes on the approach of cool weather.

"The Frigate-Bird is often seen smoothly gliding through the air, with the motions of a kite, from one to two hundred leagues from the land, sustaining these vast flights with the greatest apparent ease, sometimes soaring so high as to be scarcely visible.

"They breed abundantly in the Bahamas, and are said to make their nests on trees, if near; at other times they lay on the rocks; the eggs, one or two, are of a flesh color, marked with

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crimson spots. The young birds, covered with a grayish-white down, are assiduously attended by the parents, who are then tame, and easily approached. When alarmed, like Gulls, they as readily cast up the contents of their pouch, as those birds do of the stomach."

Genus PLOTUS: *Plotus.*—This includes the *Darters*, of which there are several species: in these the general form of the body and feet resembles that of the cormorants; but the head is smaller, and supported upon a very long, slender neck, and the beak is perfectly straight and pointed, with the edges of the mandibles denticulated. The appearance of these birds is so singular, that some of the old voyagers regarded them as anomalous creatures, partaking of the nature of the snake and the duck; and the Hottentots are said by Levaillant to give them the name of *Slange-Hals-Voogel*, or *Snake-necked birds*. They are found in the warmer parts of the world, principally in America and Africa, where they haunt the margins of rivers and lakes, perching upon the trees, or flying over the surface until a fish comes in sight, when they immediately plunge down upon it, and rarely miss their aim. When swimming, the body is generally concealed under water, and sometimes only the head is visible. Their favorite position is upon the branches of trees overhanging the water, and when disturbed they are said to glide into the water so silently that the agitation of the waves is not greater than would be produced by an eel.



THE ANHINGA OR SNAKE-BIRD.

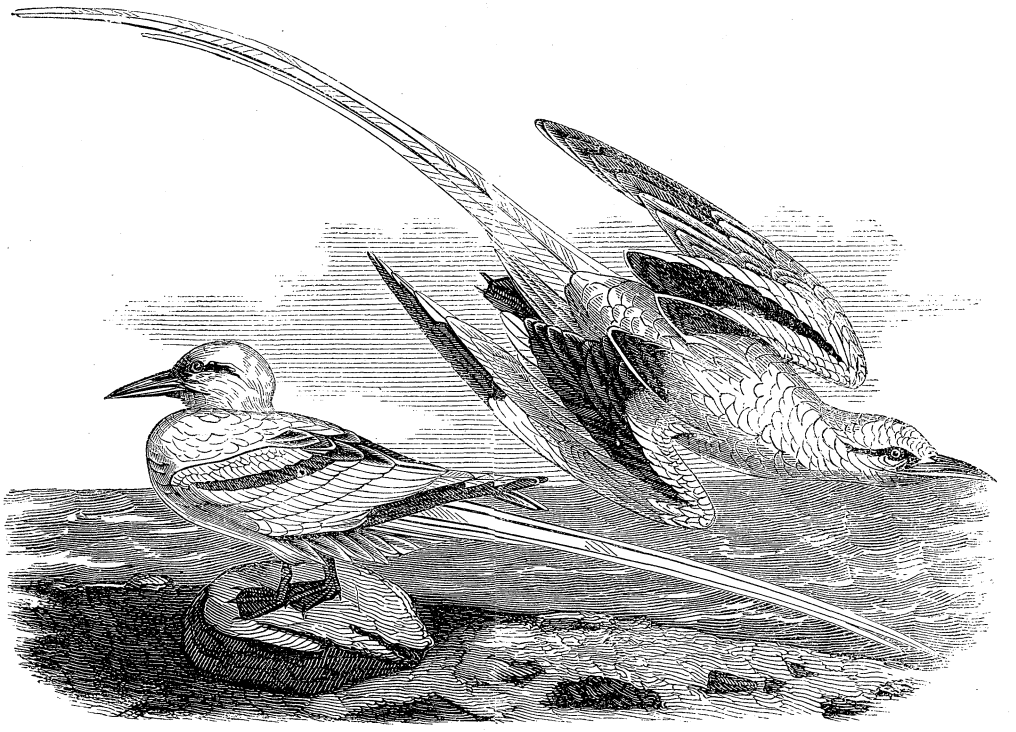
These birds, like several others of this family, are said to nidificate in trees.

The ANHINGA or SNAKE-BIRD, *P. anhinga*—sometimes called *Water-Turkey*—is two feet ten inches long; color black, with green reflections; found in the fresh waters of the South Atlantic States; also in South America as far south as Brazil. Nuttall says: "Its long and dark serpentine neck and small head, vibrating backward and forward, presents entirely the appearance of a snake, whether seen through the foliage of a tree, or emerging from the still and sluggish stream in which it often swims, with the body wholly immersed to the neck, and on being approached or startled, even that is instantly withdrawn, and sweeping beneath the flood in perfect silence, we at length see it again rise at a distance which defies approach." Another species is the *P. Levaillanti* of Africa, which closely resembles the preceding.

Genus PHAETON: *Phaeton.*—This includes the tropic birds, well known to navigators of the tropical seas, called *Straw-Tails*, and by the French, *Paille-en-queue.*

The COMMON TROPIC-BIRD, *P. æthereus*, seems to belong chiefly to the warmer parts of the Atlantic Ocean. Its body is about the size of a pullet, that is, thirteen inches long from the point of the bill to the insertion of the tail; the two long, narrow tail-feathers, which constitute a peculiarity of the bird, are seven inches. Thus its extreme length is about twenty inches. The plumage is white, with black, wavy lines on the back. Its wings are long, and its flight calm, composed of frequent strokes of the wing. It appears to fly by night as well as by day, and probably often continues on the wing for as much as twelve hours at a time. These birds are often seen far out at sea; in general, however, they return to the land at night. They live chiefly

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THE TROPIC BIRD.

within the tropics; many of them breed on the rocky islands at the east end of Porto Rico, and some on the Bermudas. They feed entirely on fish, which they capture by descending upon them and seizing them in their bills. The Smithsonian Catalogue mentions the YELLOW-BILLED TROPIC BIRD, *P. flavirostris*, found in the tropical regions of the Atlantic seas. There are several other species in the Indian and Pacific Oceans.

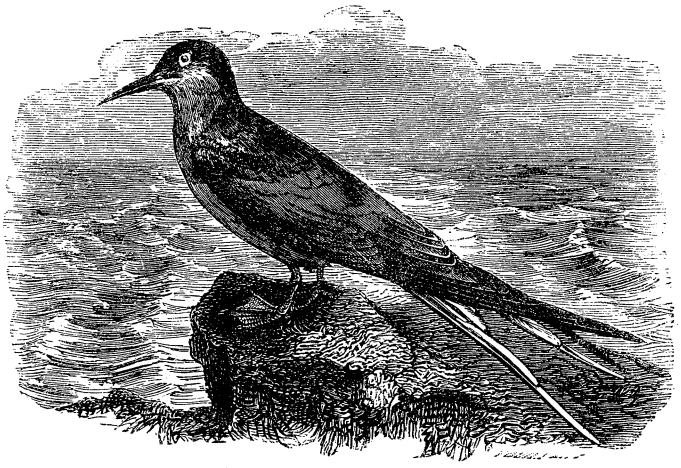
THE LARIDÆ OR GULLS.

This family includes the *Terns* or *Sea-Swallows*, the *Shearwaters*, and the *True Gulls*. All these birds have long wings, fly with great ease, and spend a great part of each day in hovering over the sea, generally along the shores, in search of food. They often sit on the water, where they are very buoyant, but they swim little, and are incapable of diving. They are active, noisy birds, mostly living on small fish, which they capture in skimming over the water.

Genus STERNA: *Sterna.*—This includes several species of *Tern.* The COMMON TERN OF EUROPE, *S. hirundo*, is fourteen inches long; ash-gray above, beneath white; builds sometimes on rocky and sometimes on low, flat, sandy islands, but always near the sea; eggs two, of a yellowish stone-color. Like the swallows of the land, it flies with great ease, and is almost the whole day on the wing, noisy, and restless, performing various graceful evolutions in the air, yet constantly looking out for the small fish on which it feeds. This species is chiefly confined to the seas of Europe; in winter it migrates to the southern latitudes.

Other species are as follows: the ARCTIC TERN, *S. Arctica;* found in Europe and America; the WHISKERED TERN, *S. leucopareia*, found in Europe: the GULL-BILLED TERN, *S. Anglica;* found in Europe and North America: the MARSH TERN—*S. aranea* of Wilson; found on our Atlantic coast: the LESSER TERN, *S. minuta*, a very elegant species; found in Europe, India, and the United States: the BLACK TERN, *S. fissipes*, common in Europe and America: the WHITE-WINGED TERN, *S. leucoptera*, a handsome species with a long tail; found in Europe; the SOOTY TERN, *S. fuliginosa*, possessing a remarkable power of flight; found in Europe, Asia, Australia, and America; and the ROSEATE TERN, *E. Douglassi;* found in Europe and America.

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THE ARCTIC TERN.

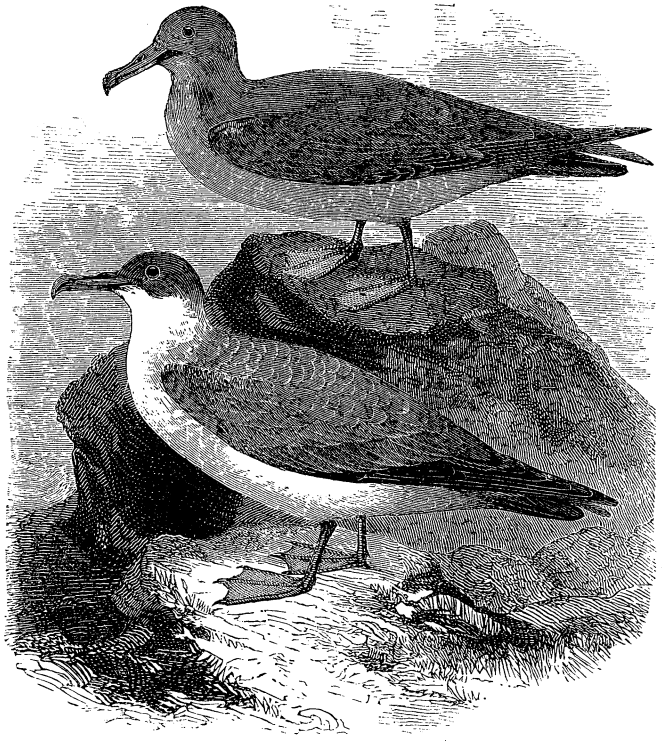
The Noddy, *S. stolida*, inhabits the tropical seas, and is occasionally seen on the coasts of the United States, and also as far north as the waters of England. Audubon gives the following pleasant account of it: "About the beginning of May the noddies collect from all parts of the Gulf of Mexico and the coasts of Florida, for the purpose of returning to their breeding places on one of the Tortugas called Noddy Rug. These birds form regular nests of twigs and dry grass, which they place on the bushes or low trees, but never on the ground. On visiting their island on the 11th May, 1832, I was surprised to see that many of them were repairing and augmenting nests that had remained through the winter, while others were employed in constructing new ones, and some were already sitting on their eggs. In a great many instances the repaired nests formed masses nearly two feet in height, and yet all of them had only a slight hollow for the eggs, broken shells of which were found among the entire ones, as if they had been purposely placed there. The birds did not discontinue their labors, although there were nine or ten of us walking among the bushes; and when we had gone a few yards into the thicket, thousands of them flew quite low over us, some at times coming so close as to enable us to catch a few of them with the hand. On one side might be seen a noddy carrying a stick in its bill, or a bird picking up something from the ground to add to its nest; on the other, several were seen sitting on their eggs unconscious of danger, while their mates brought them food. The greater part rose on the wing as we advanced, but realighted as soon as we had passed. The bushes were rarely taller than ourselves, so that we could easily see the eggs in the nests. This was quite a new sight to me, and not less pleasing than unexpected.

"The noddy, like most other species of Tern, lays three eggs, which average two inches in length by an inch and three-eighths in breadth, and are of a reddish-yellow color, spotted and patched with dull red and faint purple. They afford excellent eating, and our sailors seldom failed to collect bucketfuls daily, during our stay at the Tortugas. The wreckers assured me that the young birds remain with the old ones through the winter, in which respect the noddy, if this account be correct, differs from other species, the young of which keep by themselves till spring. At the approach of a boat the noddies never flew off their island, in the manner of the Sooty Terns. They appeared to go further out to sea than those birds, in search of their food, which consists of fishes mostly caught amid the floating sea-weeds, these Terns seizing them, not by plunging perpendicularly downward, as other species do, but by skimming close over the surface in the manner of gulls, and also by alighting and swimming round the edges of the weeds. This I had abundant opportunities of seeing while on the Gulf of Mexico. The flight of this bird greatly resembles that of the night-hawk when passing over meadows and rivers. When about to alight on the water, the noddy keeps its wings extended upward, and touches it first with its feet. It swims with considerable buoyancy and grace, and at times immerses its head to seize on a fish. It does not see well by night, and it is for this reason that it frequently alights on the

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spars of vessels, where it sleeps so soundly that it is often caught by the seamen. When seized in the hand it utters a rough cry, not unlike that of a young American crow taken from the nest. On such occasions it bites severely with quickly-repeated movements of the bill, which, on missing the object aimed at, closes with a snap. Some which I kept several days refused all kinds of food, became dull and languid, and at length died. While hovering over us near their nests, these birds emitted a low, querulous murmur, and if unmolested, would attempt to light on our heads. After a few visits, however, they became rather more careful of themselves, although the sitting birds often suffered us to put a hat over them."

The Catalogue of the Smithsonian Institution has the following: the CASPIAN TERN, *S. Caspia;* found on the coast of New Jersey: the ROYAL TERN, *S. regia;* found on the Atlantic and Pacific coasts of Southern North America: the ELEGANT TERN, *S. elegans;* found on coast of California: CABOT'S TERN, *S. acuflavida;* found in Texas and Florida: HAVELL'S TERN, *S. Havelli;* found from South Carolina to Texas: TRUDEAU'S TERN, *S. Trudeauii;* coasts of New Jersey and Long Island: WILSON'S TERN, *S. Wilsoni;* from Texas to Labrador: FORSTER'S TERN, *S. Forsteri;* from Louisiana to Labrador: and the SLENDER-BILLED TERN, *S. Pikei;* coast of California. This list by no means includes all the American species of this extensive race of birds.



THE GREATER SHEARWATER.

Genus PUFFINUS: *Puffinus.*—This includes several species popularly called *Shearwaters.* These birds have forked tails, long wings, and immense powers of flight. They skim along the surface of the ocean, frequently dipping the elongated lower mandible in the water, thus scooping up the small fishes and crustacea on which they feed. They also insert their beaks into the bivalve mollusca, which chance to be open, and then beat them on the sands or rocks till they are killed, and are thus devoured at leisure. They lay their eggs in hollows in the sand, and when the young are hatched attend to them with great devotion.

The GREATER SHEARWATER, *P. major*, is eighteen inches long; color blackish-brown above; beneath grayish-brown. Yarrell regards it as the Wandering Shearwater of Audubon and Nuttall. It is found, though rarely, in Europe; breeds abundantly on the coast of Newfoundland. The

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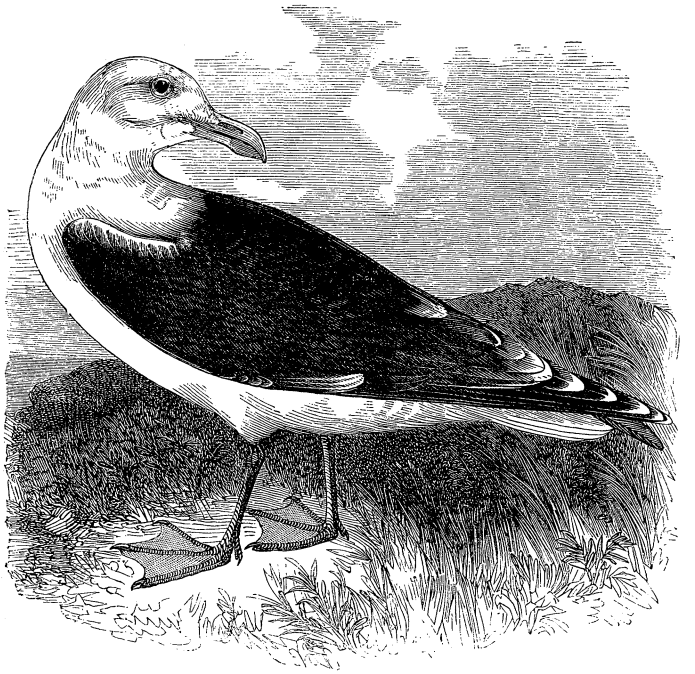
MANKS SHEARWATER, *P. Anglorum*, is fourteen inches long; found in the Atlantic, on the coasts of Europe and North America. The DUSKY SHEARWATER, *P. obscurus;* the SOOTY SHEARWATER, *P. fuliginosus;* and the CINEREOUS PETREL, *P. cinereus*, are other American species.

Genus RHYNCHOPS: *Rhynchops*, includes the BLACK SKIMMER, *R. nigra;* it is a bird of passage in the United States, appearing on our coasts in May. It breeds along the shores of Cape May and New Jersey, the nest consisting of a depression in the sand; the eggs are usually three. "The singular conformation of the bill of this bird," says Wilson, in a striking passage, "has excited much surprise; and some writers, measuring the divine proportions of nature by their own contracted standards of conception, in the plentitude of their vanity, have pronounced it to be 'a lame and defective weapon.' Such ignorant presumption, or rather impiety, ought to hide its head in the dust, on a calm display of the peculiar construction of this singular bird, and the wisdom by which it is so admirably adapted to the purposes or mode of existence for which it was intended. The Shearwater is formed for skimming, while on the wing, the surface of the sea for its food, which consists of small fish, shrimps, young fry, &c., whose usual haunts are near the shore and toward the surface. That the lower mandible, when dipped into and cleaving the water, might not retard the bird's way, it is thinned and sharpened like the blade of a knife; the upper mandible, being at such times elevated above water, is curtailed in its length, as being less necessary, but tapering gradually to a point, that, on shutting, it may offer less opposition. To prevent inconvenience from the rushing of the water, the mouth is confined to the mere opening of the gullet, which, indeed, prevents mastication taking place; but the stomach, or gizzard, to which this business is solely allotted, is of uncommon hardness, strength, and muscularity, far surpassing, in these respects, any other water-bird with which I am acquainted. To all these is added a vast expansion of wing, to enable the bird to sail with sufficient celerity, while dipping in the water. The general proportion of the length of our swiftest hawks and swallows to their breadth, is as one to two; but in the present case, as there is not only the resistance of the air, but also that of the water, to overcome, a still greater volume of wing is given, the Shearwater measuring nineteen inches in length, and upward of forty-four in extent. In short, whoever has attentively examined this curious apparatus, and observed the possessor, with his ample wings, long, bending neck, and lower mandible, occasionally dipped into and plowing the surface, and the facility with which he procures his food, cannot but consider it a mere playful amusement, when compared with the dashing immersions of the tern, the gull, or the fish-hawk, who, to the superficial observer, appear so superiorly accommodated.

"The Shearwater is most frequently seen skimming close along shore about the first of the flood, at which time the young fry, shrimp, &c., are most abundant in such places. There are also numerous inlets among the low islands between the sea-beach and main-land of Cape May, where I have observed the Shearwaters, eight or ten in company, passing and repassing, at high water, particular estuaries of those creeks that run up into the salt marshes, dipping, with extended neck, their open bills into the water, with as much apparent ease as swallows glean up flies from the surface. On examining the stomachs of several of these, shot at the time, they contained numbers of a small fish, usually called *silver-sides*, from a broad line of a glossy silver color that runs from the gills to the tail. The mouths of these inlets abound with this fry or fish, probably feeding on the various matters washed down from the marshes.

"The voice of the Shearwater is harsh and screaming, resembling that of the Tern, but stronger. It flies with a slowly-flapping flight, dipping, occasionally, with steady, expanded wings and bended neck, its lower mandible into the sea, and with open mouth receiving its food as it plows along the surface. It is rarely seen swimming on the water; but frequently rests in large parties on the sand-bars at low water. One of these birds, which I wounded in the wing, and kept in the room beside me for several days, soon became tame, and even familiar. It generally stood with its legs erect, its body horizontal, and its neck rather extended. It frequently reposed on its belly, and stretching its neck, rested its long bill on the floor. It spent most of its time in this way, or in dressing and arranging its plumage with its long, scissors-like bill, which it seemed to perform with great ease and dexterity. It refused every kind of food offered it, and I am persuaded never feeds but when on the wing."

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THE GREAT BLACK-BACKED GULL.

Genus LARUS: *Larus.*—This includes several species of *Gull*, a very numerous race, dispersed along the shores of the ocean in nearly all parts of the world. These are exceedingly voracious birds, continually skimming over the surface of the waves in search of their finny prey, and often following the shoals of fish to great distances. They generally congregate in vast numbers at their breeding-places, which are most frequently rocky islands or headlands in the ocean. Most of them are somewhat migratory, usually visiting northern regions during the summer for the purpose of incubation. The following lines give an accurate picture of these remarkable birds:

"On nimble wing the gull
Sweeps booming by, intent to cull,
Voracious, from the billow's breast,
Mark'd far away, his destined feast.
Behold him now, deep plunging, dip
His sunny pinion's sable tip
In the green wave; now lightly skim
With wheeling flight the water's brim;
Wave in blue sky his silver sail
Aloft, and frolic with the gale,
Or sink again his breast to lave,
And float upon the foaming wave.
Oft o'er his form your eyes may roam
Nor know him from the feathery foam,
Nor 'mid the rolling waves, your ear
On yelling blast, his clamor hear."

The GREAT BLACK-BACKED GULL, *L. marinus*, is about thirty inches long; back lead-gray, head, neck, and lower parts white; breeds in marshes; male and female assist in making the nest, which is of grass; the eggs are three. This bird flies with great ease, and swims buoyantly on the water. It feeds chiefly on fish, and also sometimes on small birds. It has been known to destroy weak lambs; it is common in the European and American seas.

The LAUGHING or BLACK-HEADED GULL, *L. ridibundus*, is seventeen inches long, and, according to Wilson, is one of "the most beautiful and sociable of its genus. They make their appearance on the coast of New Jersey late in April, and do not fail to give notice of their arrival by their familiarity and loquacity. The inhabitants treat them with the same indifference that they manifest toward all those harmless birds which do not minister either to their appetite or their avarice, and hence the Black-Heads may be seen in companies around the farm-house, coursing along the river-shores, gleaning up the refuse of the fishermen, and the animal substances left by the tide; or scattered over the marshes and newly-plowed fields, regaling on the worms, insects, and their

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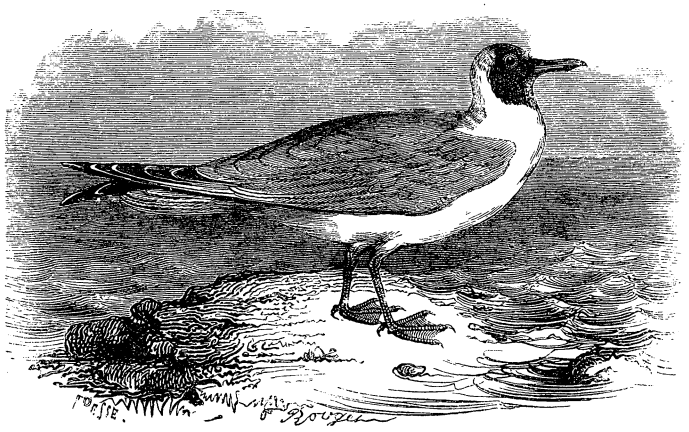
larvæ, which, in the vernal season, the bounty of nature provides for the sustenance of myriads of the feathered race.

"On the Jersey side of Delaware Bay, in the neighborhood of Fishing Creek, about the middle of May, the Black-headed Gulls assemble in great multitudes, to feed upon the remains of the king crabs which the hogs have left, or upon the spawn which those curious animals deposit in the sand, and which is scattered along the shore by the waves. At such times, if any one approach to disturb them, the Gulls will rise up in clouds, every individual squalling so loud that the roar may be heard at the distance of two or three miles.

"It is an interesting spectacle to behold this species when about recommencing their migrations. If the weather be calm, they will rise up in the air, spirally, chattering all the while to each other in the most sprightly manner, their notes at such times resembling the singing of a hen, but far louder, changing often into a *haw, ha, ha, ha, haw!* the last syllable lengthened out like the excessive laugh of a negro. When mounting and mingling together, like motes in the sunbeams, their black heads and wing-tips, and snow-white plumage, give them a very beautiful appearance. After gaining an immense height, they all move off, with one consent, in a direct line toward the point of their destination.

"This bird breeds in the marshes. The eggs are three in number, of a dun clay color, thinly marked with small, irregular touches of a pale purple, and pale brown; some are of a deeper dun, with larger marks, and less tapering than others; the egg measures two inches and a quarter by one inch and a half."

Other species are as follows: Sabine's Gull, *L. Sabini:* Bonaparte's Gull, *L. Bonapartii:* the Masked Gull, *L. capistratus:* the American Gull, *L. zonorrhynchus* and *canus:* the Kittiwake Gull, *L. tridactylus:* the Ivory Gull, *L. eburneus:* the Iceland Gull, *L. Islandicus:* the Herring Gull, *L. argentatus:* the Cuneate-tailed Gull, *L. Rossii;* and the Glaucous Gull, *L. glaucus:* all found in Europe and North America.



THE MASKED GULL.

The Lesser Black-backed Gull, *L. fuscus*, and the Little Gull, *L. minutus*, belong to Europe.

Besides the preceding, the Smithsonian Catalogue has the following: the Glaucous-winged Gull, *L. glaucescens:* the White-winged Gull, *L. leucopterus:* the Gray-winged Gull, *L. chalcopterus:* the Western Gull, *L. occidentalis:* the California Gull, *L. Californicus:* the Ring-billed Gull, *L. Delawarensis:* and Suckley's Gull, *L. Suckleyi:* all found in American waters.

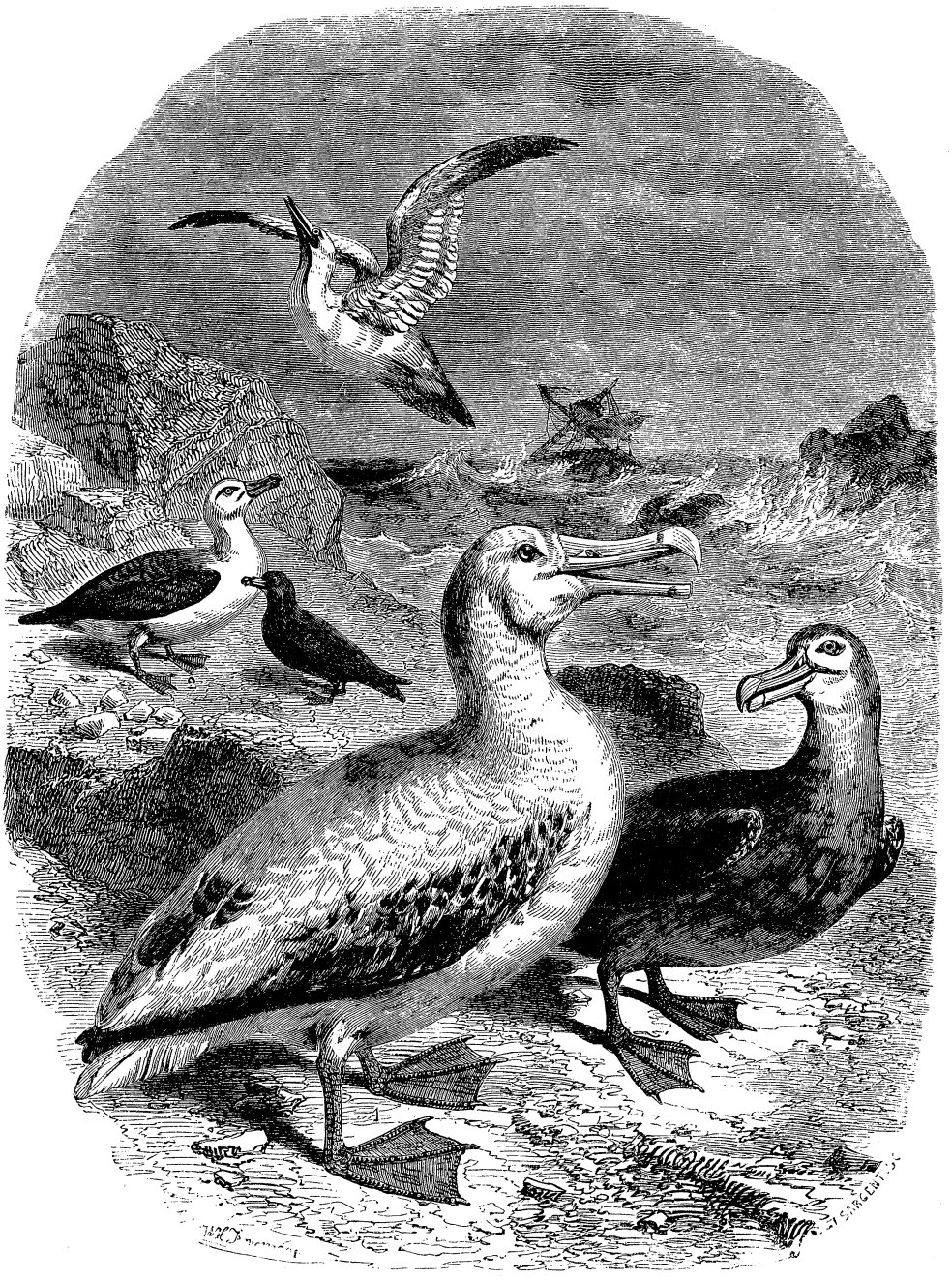
Genus LESTRIS: *Lestris.*—This includes several species of gulls, to which the name of *Squa* is given. The Common Skua, *L. cataractes*, is twenty-four inches long; dark brown above; clove-brown beneath. It is an active, vigorous, and daring bird, and is constantly occupied in harassing the true gulls, which are of a more listless and timid nature. When it sees one of them has captured a fish, it makes a fierce attack, and obliges it, through fear, to disgorge its prey, upon which the skua darts upon it and seizes it before it reaches the water. This bird does not associate in groups, but lives in pairs; it breeds on the rocks, and lays three eggs. It is found throughout the seas of Northern Europe.

Other species are the Pomerine Skua, *L. pomarinus:* Richardson's Skua, *L. Richardsonii:* Buffon's Skua, *L. Buffonii:* all found in Europe and America.

The following allied species are given in the Smithsonian Catalogue: the White-headed Gull,

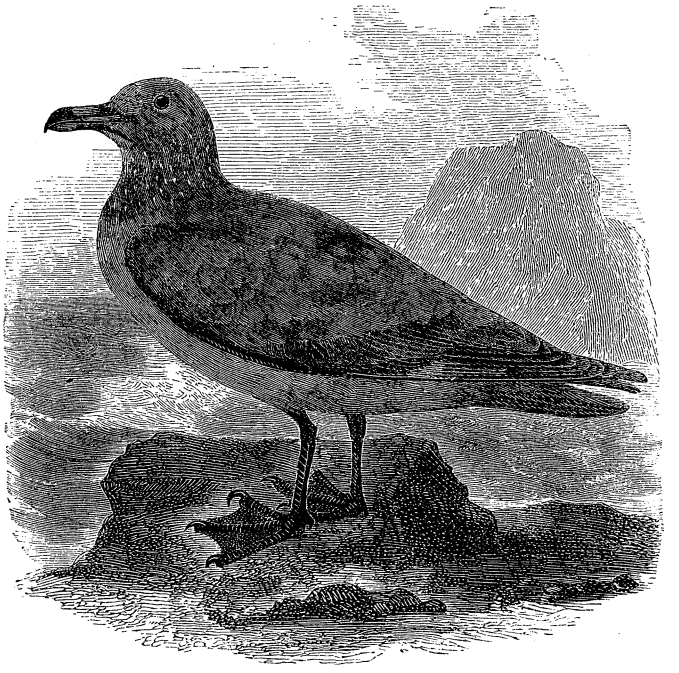
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ALBATROSSES.

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THE COMMON SKUA.

Blasipus Heermanni: FRANKLIN'S ROSY GULL, *Chroicocephalus Franklinii:* the HOODED GULL, *C. cucullatus:* the NORTH PACIFIC KITTIWAKE, *Rissa septentrionalis:* the SHORT-BILLED KITTIWAKE, *R. brevirostris:* the YELLOW-BILLED GULL, *R. nivea:* the SHORT-LEGGED GULL, *Pagophila brachytarsi:* and the SWALLOW-TAILED GULL, *Creagrus furcatus:* all found in American waters.

There are still many other species.

THE PETRELS.

This family includes the *Albatrosses*, *Fulmars*, and *True Petrels*, all of which resemble the Gulls, but spend their lives in skimming over the waves, seeming to take delight in rough weather, whence sailors often regard their presence as the harbinger of storms.

Genus DIOMEDEA: *Diomedea*, includes several species. The COMMON or WANDERING ALBATROSS, *D. exulans*, is among the largest of sea-birds, being three feet long, and having twelve to sixteen feet expanse of wing. The plumage is white, except that the head is gray, and there are several transverse black bands on the back. It feeds on fish and other animal substances. So voracious is it, that it is often taken by a baited hook, thrown out from a ship. Its weight is twenty-five to thirty pounds, yet it sustains itself in the air for many hours together. When the flying-fish are driven to take wing by the pursuit of the dolphins, many of them are instantly pursued and seized by this swift and greedy bird. So watchful is it for food, that when once a sailor fell overboard near the island of St. Paul's, in the Indian Ocean, several albatrosses immediately attacked him. His hat was found pierced by their bills, and it was supposed that they entered his skull and killed him. This species is very widely distributed, being found in the seas of Southern Africa, Behring's Straits, and other places. It is often met with far out at sea, and the sailors have many superstitions concerning it. The poet has said:

"How oft, thou wanderer of the stormy deep,
Is the poor sea-boy wakened from his dream
Of home and home's delights, when, half asleep,
High in the shrouds, he hears thy startling scream.

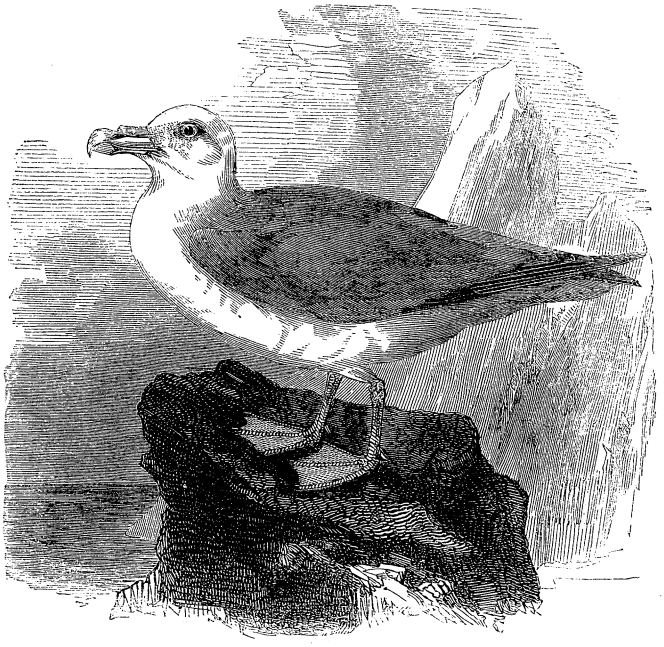
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"Safe in the storm, unhurt by wave or wind,
Or through the fearful tempest dost thou soar,
The fleetest vessels leaving far behind,
Unchecked amidst the elemental roar.

"Alas! how sure the hand that guides thy wing,
How safe the rudder, instinct, shapes thy course;
Ah! how unlike things made by hands of clay—
Thy piercing eyes, thy pinions' matchless force."

Though the general history of this species is serious, one thing may be mentioned which is otherwise. Their mode of selecting their mates, and also their courtship, is described as very ludicrous. The couple approach one another with great apparent ceremony, bringing their beaks repeatedly together, swinging their heads, and contemplating each other with very deliberate attention. Sometimes this will continue for two hours together.

Other species are the SHORT-TAILED ALBATROSS, *D. brachyura*, found in the Northern Pacific, and on the western coast of North America, figured by Cassin: the SOOTY ALBATROSS, *D. fuliginosa*, and the YELLOW-NOSED ALBATROSS, *D. chlororhyncha*.



THE FULMAR PETREL.

The *Petrels* consist of several genera. The genus PROCELLARIA: *Procellaria*, includes the FULMARS, which are active and greedy birds, of large size, distributed throughout the northern portions of the Atlantic. They exist in almost incredible numbers on the rocky precipices of St. Kilda, where they form one of the principal means of support to the inhabitants. The collecting of the eggs, and the capturing of the birds in these wild and giddy heights, demand a degree of courage and daring perhaps beyond any other human pursuit. A person is very often swung over a precipice by a rope, and is let down two or three hundred feet, while the ocean roars and tumbles a thousand feet beneath him. The eggs and feathers of these birds are not the only objects of pursuit. When a Fulmar is seized, it instantly vomits a quantity of clear umber-colored oil, which, although its odor is exceedingly disagreeable, is a valuable article of commerce. Fulmer oil is, in fact, one of the most important productions of this island. Mr. J. Wilson, who visited the site of these scenes, gives the following vivid description: "While bearing toward the appointed place of rendezvous in the cutter, we enjoyed some splendid tacking off and on the

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island, beholding from various points its vast and wave-worn caverns filled with the murmuring sea—its deep, dark, rocky battlements—and, over all, the cloud-capped summits of the hoary Connagher, the highest mountain of St. Kilda. As we approached a stupendous precipice we could see the people perched like jackdaws along its edge, and that we might be as near as possible to the scene of action, we got into the small boat, and rowed—minister and all—toward the mural shore. It was almost fearful to behold it hanging in such huge and ponderous masses overhead—

'Cliffs of darkness, caves of wonder,
Echoing the Atlantic's thunder!'

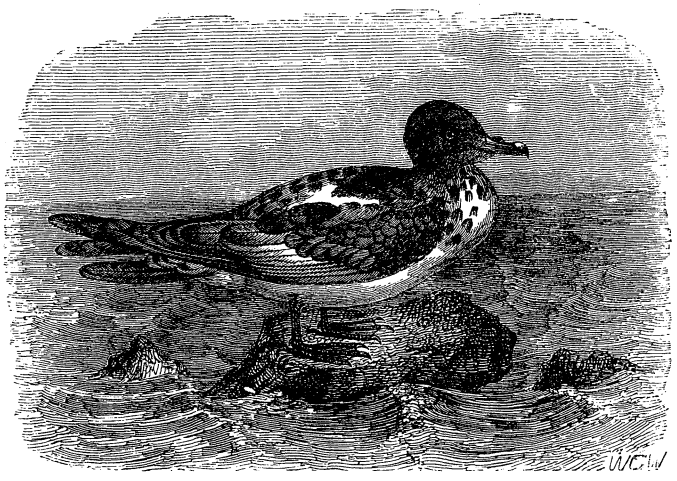
"We then stood still upon our oars, and the minister rose and waved his hat. Suddenly we could hear in the air above us a faint huzzaing sound, and at the same instant three or four men, from different parts of the cliff, threw themselves into the air, and darted some distance downward, just as spiders drop from the top of a wall. They then swung and capered along the face of the precipice, bounding off at intervals by striking their feet against it, and springing from side to side with as much fearless ease and agility as if they were so many schoolboys exercising in a swing a few feet over a soft and balmy clover-field. Now they were, probably, not less than seven hundred feet above the sea, and the cliff was not only perpendicular in its upper portion, but as it descended it curved backward, as it were, forming a huge, rugged, hollow portion, eaten into by the angry lashing of the almost ceaseless waves. In this manner, shouting and dancing, they descended a long way toward us, though still suspended at a vast height in the air, for it would probably have taken all their cordage joined together to have reached the sea. A great mass of the central portion of the precipice was smoother than the wall of a well-built house, and it was this portion especially which was not only perpendicular, but had its basement arched inward into an enormous wave-worn grotto, so that any one falling from the summit would drop at once sheer into the sea."

The great dependence of the bird-catchers of St. Kilda is upon ropes of two sorts: one made of hides, the other of hair of cows' tails, all of the same thickness. The former are the most ancient, and still continue in the greatest esteem, as being stronger and less liable to wear away or be cut by rubbing against the sharp edges of rocks. These ropes are of various lengths, from ninety to a hundred and twenty, and nearly two hundred feet in length, and about three inches in circumference. Those of hide are made of cows' and sheep's hides mixed together. The hide of the sheep, after being cut into narrow slips, is platted over with a broader slip of cow's hide. Two of these are then twisted together; so that the rope, when untwisted, is found to consist of two parts, and each of these contains a length of sheep-skin covered with cow's hide. For the best, they will ask about thirteen-pence a fathom, at which price they sell them to each other. So valuable are these ropes, that one of them forms the marriage portion of a St. Kilda girl, and, to this secluded people, to whom moneyed wealth is little known, is an article on which often life itself, and all its comforts, more or less depends, far beyond gold and jewels.

In general, the daring performances of these people, however frightful to those who are unused to them, pass without accident; there are instances, however, in which the danger is vividly presented. A lady who lived about two miles from the South Stack, on the rocky coast of Rhoscolin, sent a boy in search of samphire, with a trusty servant to hold the rope at the top. While the boy was dangling midway between sky and water, the servant, who was unused to his situation, whether owing to a sudden dizziness from looking downward on the boy's motions, or misgivings as to his own powers of holding him up, felt a cold, sickly shivering creep over him, accompanied with a certainty that he was about to faint; the inevitable consequence of which, he had sense enough left to know, would be the certain death of the boy, and, in all probability, of himself, as in the act of fainting it was most likely he would fall forward, and follow the rope and boy down the precipice. In this dilemma, he uttered a loud, despairing scream, which was fortunately heard by a woman working in an adjoining field, who, running up, was just in time to catch the rope as the fainting man fell senseless at her feet.

We shall add a few more incidents, equally hazardous, and one fatal. Many bird-catchers go on these expeditions without any companion to hold the rope or assist them. It was on such a soli-

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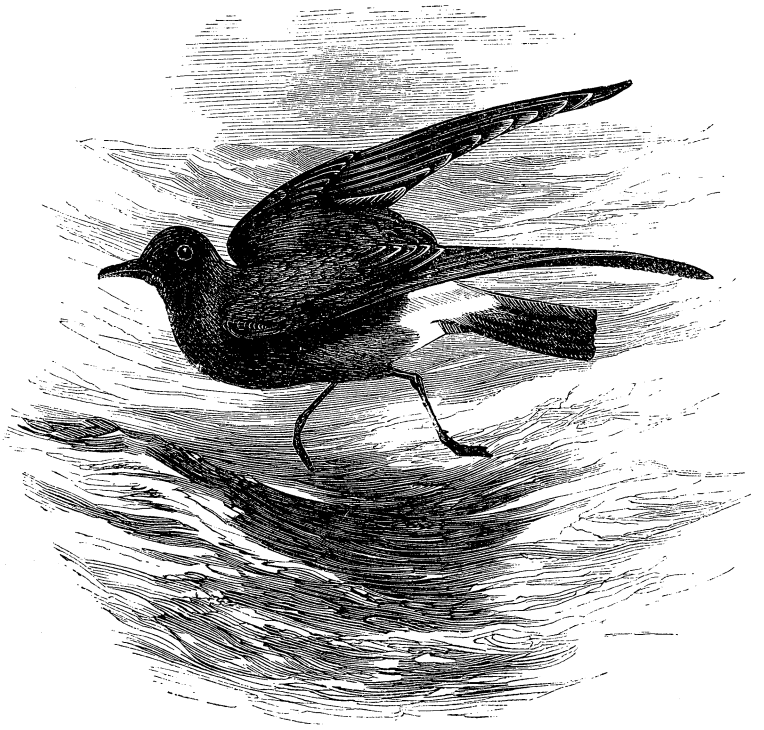
THE CAPE FULMAR.

tary excursion that a man, having fastened his rope to a stake on the top, let himself down far below, and, in his ardor for collecting birds and eggs, followed the course of a ledge, beneath a mass of overhanging rock; unfortunately, he had omitted to take the usual precaution of tying the rope round his body, but held it carelessly in his hand, when, in a luckless moment, as he was busily engaged in pillaging a nest, it slipped from his grasp, and, after swinging backward and forward three or four times, without coming within reach, at last became stationary over the ledge of the projecting rock, leaving the bird-catcher apparently without a chance of escape; for to ascend the precipice without a rope was impossible, and none were near to hear his cries or afford him help. What was to be done? Death stared him in the face. After a few minutes' pause he made up his mind. By a desperate leap he might regain the rope; but if he failed, and, at the distance at which it hung, the chances were against him, his fate was certain, amid the pointed crags ready to receive him, over which the waves were dashing far, far below. Collecting, therefore, all his strength, with outstretched arms he sprang from the rock, and lived to tell the tale—for the rope was caught!

The next occurred at St. Kilda, where, among other modes of catching the sea-fowl, that of setting gins or nooses is adopted. They are fixed in various places frequented by the birds. In one of these, set upon a ledge a hundred and twenty feet above the sea, a bird-catcher entangled his foot, and not being at the moment aware of it, was, on moving onward, tripped up, and precipitated over the rock, where he hung suspended. He too, as in the preceding case, had no companion, and to add to his misfortune, darkness was at hand, leaving little prospect of his being discovered before morning. In vain he exerted himself to bend upward, so as to reach the noose or grapple the rock. After a few fruitless efforts, his strength was exhausted, and in this dreadful situation, expecting, moreover, that the noose might give way every instant, did he pass a long night. At early dawn, by good fortune, his shouts were heard by a neighbor, who rescued him from his perilous suspension.

The last we shall relate terminated in a more awful manner. A father and two sons were out together, and, having firmly attached their rope at the summit of a precipice, descended, on their usual occupation. Having collected as many birds and eggs as they could carry, they were all three ascending by the rope—the eldest of the sons first, his brother a fathom or two below him, and the father following last. They had made considerable progress, when the elder son, looking upward, perceived the strands of the rope grinding against a sharp edge of rock, and gradually giving way. He immediately reported the alarming fact. "Will it hold together till we can gain the summit?" asked the father. "It will not hold another minute," was the reply; "our triple weight is loosening it rapidly!" "Will it hold one?" said the father. "It is as much as it can do," replied the son; "even that is doubtful." "There is then a chance, at

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THE STORMY PETREL.

least, of one of us being saved; draw your knife, and cut away below!" was the cool and intrepid order of the parent; "Exert yourself; you may yet escape, and live to comfort your mother!" There was no time for discussion or further hesitation. The son looked up once more, but the edge of rock was cutting its way, and the rope had nearly severed. The knife was drawn, the rope was divided, and his father and brother were launched into eternity!

The Fulmar Petrel, *P. glacialis*, is nineteen inches long, pearl-grav above and white beneath. It is seen in all parts of the North Atlantic, and is a constant attendant on the whale fisheries; nothing can exceed the voracity with which these creatures devour the portion of fat which falls to their share on the cutting up of a whale.

The Giant Fulmar, *P. gigantea*, is the largest known species, being somewhat larger than a goose, and is called the *Bone-Breaker*. Its plumage is blackish-gray; it feeds on insects, mollusca, fish, and the flesh of dead cetacea that it meets with floating on the sea. Found from Cape Horn to the Cape of Good Hope.

The Cape Petrel or Fulmar, *P. Capensis*, is of the size of a small duck; its general plumage above is black, with masses of white; beneath it is white. This bird is called *Damier* and *Pintado* by the French. It inhabits the southern seas.

Other species are the Slender-billed Fulmar, *P. tenuirostris*, and the Tropical Fulmar, *P. meridionalis*, the first found on the Pacific coast, and the latter on the Atlantic coast of North America. The Pacific Fulmar, *P. Pacifica*, is found on the Pacific coasts of North America.

Genus THALASSIDROMA: *Thalassidroma*.—This includes the *True Petrels*, which are much smaller than the Fulmars, some of a light swallow-like form and appearance. The Stormy-Petrel, *T. pelagica*, is the smallest of web-footed birds. The length is about six inches; the plumage almost entirely black. It inhabits nearly the whole Atlantic, and is always seen by vessels crossing this ocean, sometimes following in their wake for days together, picking up pieces of meat and fat that are thrown overboard. Often half a dozen birds will descend on a single fragment and struggle for the possession of it. In a storm, they are seen whirling amid

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the raging blast, now stooping to the angry waves, and now shooting upward toward the clouds, as if enjoying a frolic. At night, they usually repose by sitting on the water. They breed on the rocky coasts, especially of the islands of Europe and America; the eggs are two, of a soiled white. When engaged in incubation, they may be taken off their nests with the hand. The appearance of these birds at sea has been supposed to portend stormy weather, and they are therefore not welcome visitors to sailors, who call them *Devil's Birds*, *Witches*, and *Mother Carey's Chickens*. The last title is said to have been originally bestowed upon them by Captain Carteret's sailors, probably from some celebrated ideal hag of that name. Their habit of paddling along the surface of the water obtained for them the name of *Petrel*, from the Apostle Peter, who walked upon the water.

Other species are the Fork-tailed Petrel, *T. Leachii*, found on our coast from Massachusetts to Baffin's Bay: Wilson's Stormy Petrel, *T. Wilsonii*, found along the Atlantic coast of North America: Hornby's Petrel, *T. Hornbyi*, and the Black Stormy Petrel, *T. melania*, both found on the northwest coast of North America. The Black-and-White Stormy Petrel, *Fregetta Lawrencii*, is found on the coast of Florida. The habits of all are similar to those of the Stormy Petrel we have described. It is probably to the birds of this species—the fearless riders of the storm and the tempest—that the poet Brainard refers in the following powerful lines:

THE SEA-BIRD'S SONG.

"On the deep is the mariner's danger,
On the deep is the mariner's death;
Who, to fear of the tempest a stranger,
Sees the last bubble burst of his breath?
'Tis the sea-bird, sea-bird, sea-bird,
Lone looker on despair;
The sea-bird, sea-bird, sea-bird,
The only witness there!

"Who watches their course, who so mildly
Careen to the kiss of the breeze?
Who lists to their shrieks, who so wildly
Are clasped in the arms of the seas?
'Tis the sea-bird, &c.

"Who hovers on high o'er the lover,
And her who has clung to his neck?
Whose wing is the wing that can cover
With its shadow the foundering wreck?
'Tis the sea-bird, &c.

"My eye in the light of the billow,
My wing in the wake of the wave;
I shall take to my breast for a pillow
The shroud of the fair and the brave!
I'm the sea-bird, &c.

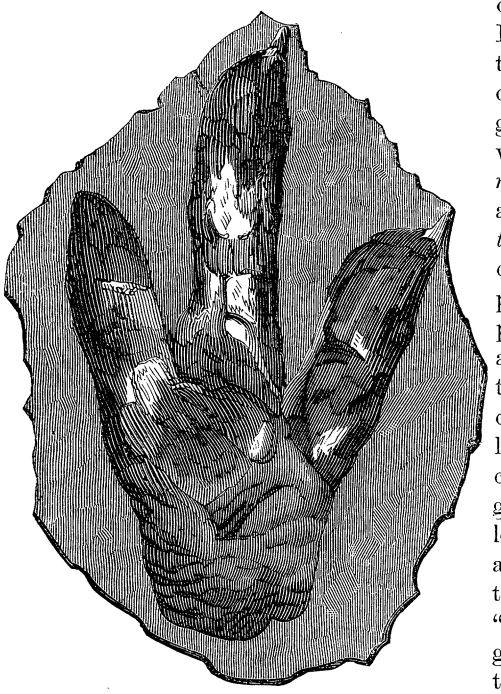
"My foot on the iceberg has lighted
When hoarse the wild winds veer about;
My eye, when the bark is benighted,
Sees the lamp of the light-house go out!
I'm the sea-bird, sea-bird, sea-bird,
Lone looker on despair;
The sea-bird, sea-bird, sea-bird,
The only witness there!"

Fossil Birds.—In a former part of our work we have spoken of the remains of the gigantic *Moa* or *Diornis*, found in New Zealand, which, with other facts, has led to the opinion that this great island, together with Norfolk Island, Chatham Island, and others in that quarter, are but the mountain tops of a continent, now sunk beneath the ocean, but formerly peopled with birds of strange forms, of which we now only find the bones, or a few scattered and nearly extinct species. Probably there were also other animals there as peculiar as these birds. We have

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noticed the remains of the gigantic *Epiornis* of Madagascar, as well as those of other species of birds found on the island of Rodriguez. But all these are supposed to be of comparatively recent origin. The bones of birds of high geological antiquity have not been found in great numbers, probably because they are hollow and easily destroyed, and because, also, by their means of flight, birds have generally been able to escape those great convulsions of nature, such as floods, landslides, &c., which have ingulfed the larger animals, whose bones are so abundant in the ancient deposits of soils and rocks. Their forms are also so light, that, aided by their feathers, they would naturally float on the surface of the waters, and thus decay and disappear.

Nevertheless, in the tertiary deposits of India, France, and England, the bones of several genera of birds have been discovered. In the basin of Paris they have been met with in connection with the bones of the *Palæothereum*, &c.; in the chalk-cliffs near Maidstone, England, the remains of a gigantic species of Albatross have been found, to which Mr. Owen has given the name of *Cimoliornis Diomedeus*. But although the bones of birds are thus deficient in the more ancient strata, their *tracks* have been discovered in various places in different countries, and under circumstances which prove that they must have been made thousands, perhaps millions of years ago. The most remarkable of these, or those which have been most thoroughly explored, are in the valley of Connecticut River. Professor Hitchcock, of Amherst College, Massachusetts, first drew attention to these curious relics, and he has, in various publications, given the result of his researches in this rich geological field. In 1858, in obedience to a public act, he made an elaborate report on the subject to the legislature of Massachusetts, which he entitles "Ichniology of New England." He here gives a great variety of details, and abundant plates, illustrative of the remains of which he treats, a copy of one of which we here insert. The general result of these researches he states as follows:



FOOT-PRINT OF BRONTOZOUM GIGANTEUM—THE ORIGINAL EIGHTEEN INCHES LONG.

"Let us now take a synoptical view of the species of animals that once lived in the Connecticut valley, as made known by their tracks. As already stated again and again in describing them, I expect that future discoveries will strike out some of these species; but my prediction is that they will bring a still larger number of new ones to light.

Number of localities of tracks in the valley thus far discovered	38
Length of the sandstone-belt containing tracks, 90 miles	
Width " " " " 2 or 3 "	
Whole number of species in the valley described above	119
Number of bipeds	31
Number of quadrupeds	55
With more than four feet	18
Without proper feet	12
With an uncertain number	3
Marsupialoid animals	5
Thick-toed birds	14
Narrow-toed birds	17
Ornithoid lizards or batrachians	10
Lizards	17
Batrachians—the frog and salamander family	11
Chelonians—the tortoise family	8
Fishes	4
Crustaceans, myriapods, and insects	18
Annelids—the naked worms	8
Of uncertain place	6

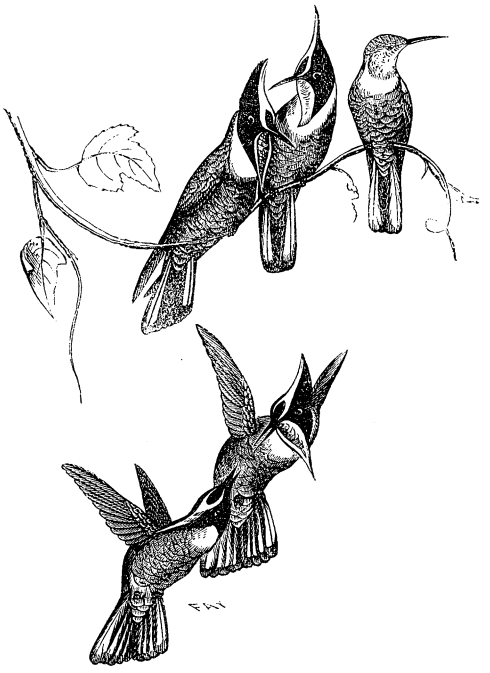
What an amazing revelation is this! Animals totally unlike any that now exist in these localities, and whose likeness is only found in living species amid the eccentricities of Australia, once lived and flourished here! They were not only of strange forms—strange to these regions—but some of them strange to the world, and in some instances of enormous size. One of the

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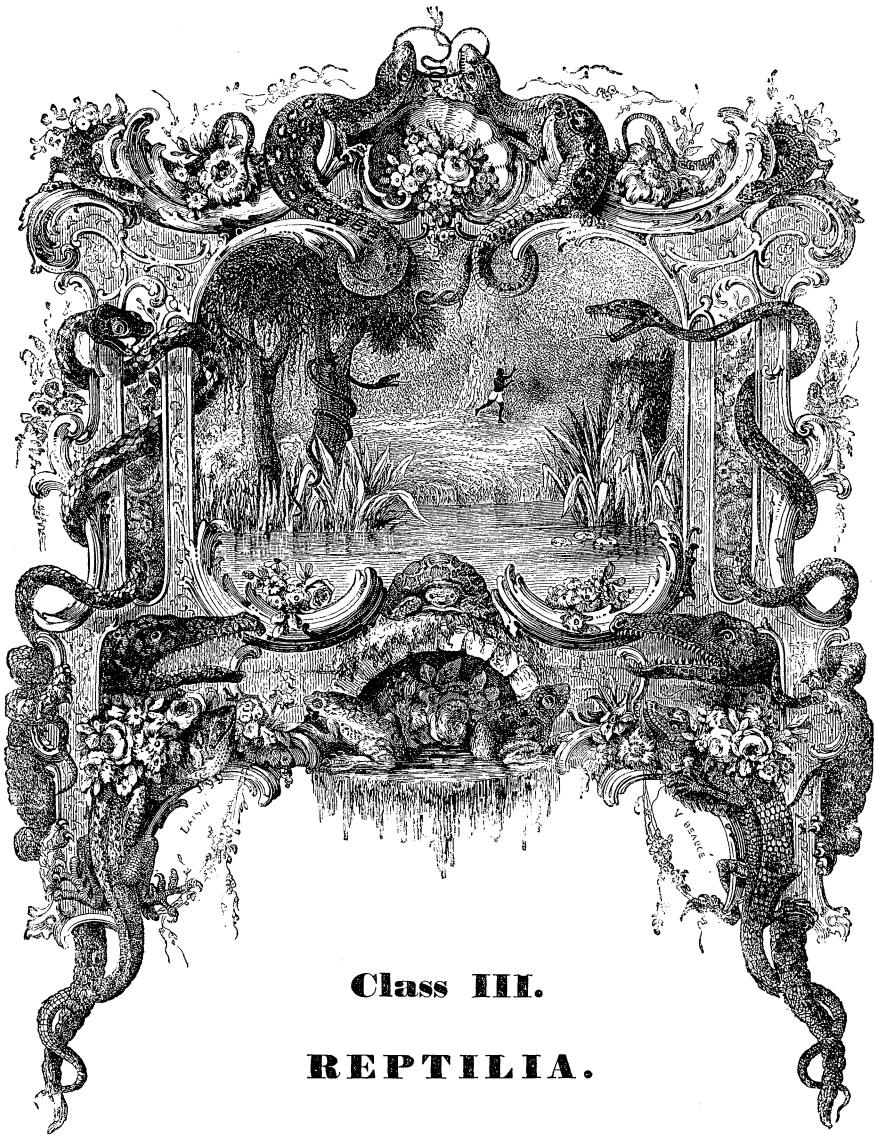
birds, called *Brontozoum giganteum*, of the cassowary kind, had a foot eighteen inches long, and must have weighed from four hundred to eight hundred pounds—four times the weight of the ostrich! And all these things are written on the ancient sandstone rocks, beneath the surface of the soil; and so certain, so minute is the record, that even the rain-drops that pattered on the sands while these creatures were living here, are imperishably preserved. And these things were written by the finger of God—who can doubt it? And who can doubt that Man—the being competent to read the record, and after the lapse of ages, actually present here to read it—is the object of care, of sympathy, to Him who alike made and preserved these inscriptions, and made and preserved and taught generations to interpret them? The poet has said, in respect to common objects which strike the mind on the surface of the earth—

> "And this our life,———
> Finds tongues in trees, books in the running brooks,
> Sermons in stones, and good in every thing."

Shall not man, in view of these and other revelations of geology, rise to a higher life, which shall find something more than mere sermons in this Book of Rocks, with the imprint of the Almighty on its title-page? We have seen but the beginning; we know that mankind have but just entered upon this study, which ages on ages cannot exhaust. Yet how wonderful the record—and every page of it speaking of God, and tracing his footsteps while laying the foundations of the world, long, long before he walked with man in the Garden of Eden. Do we not, must we not derive this great good from such a view—the manifest truth that God made man to intepret his works; and does not the firm conviction follow, that a being thus endowed, is not limited to a transient existence, but is bound to immortality? How inevitable is the hope, how confident the anticipation of a future life—which shall unfold man's capacities, and give scope to man's destiny—springing up in the soul from such contemplations! And will not God fulfill the hopes thus inspired, and perform the promises thus implied?



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Class III.

REPTILIA.

The Reptilia comprise four orders very distinct in some respects, though united in others: the CHELONIA, or *Tortoises;* the LORICATA, or *Crocodiles;* the SAURIA, or *Lizards;* and the OPHIDIA, or *Serpents.* These are generally regarded with little favor by mankind, but their natural history is nevertheless full of interest. With the exception of a few tortoises they are all carnivorous animals. They have all a slow circulation; their blood is cold, that is, but little above the temperature of the surrounding medium; the amount of their aggregate muscular energy is less than in the mammalia; their movements are generally crawling and swimming; and though some of them leap and run with celerity on certain occasions, their habits are generally sluggish, their digestion slow, their sensations obtuse, and in cold or temperate climates they pass nearly the whole winter in a state of lethargy; they continue to live and to execute voluntary movements for a considerable time after having been deprived of the brain, and even when the head is severed from the body. Their heart pulsates, in some cases, for many hours after it has been detached, and its loss does not deprive the body of mobility for a still longer period. Their blood not being warm, they do not require teguments capable of retaining heat; they are accordingly covered with shells, scales, or naked skin. No reptile incubates its eggs. In certain genera of batrachians

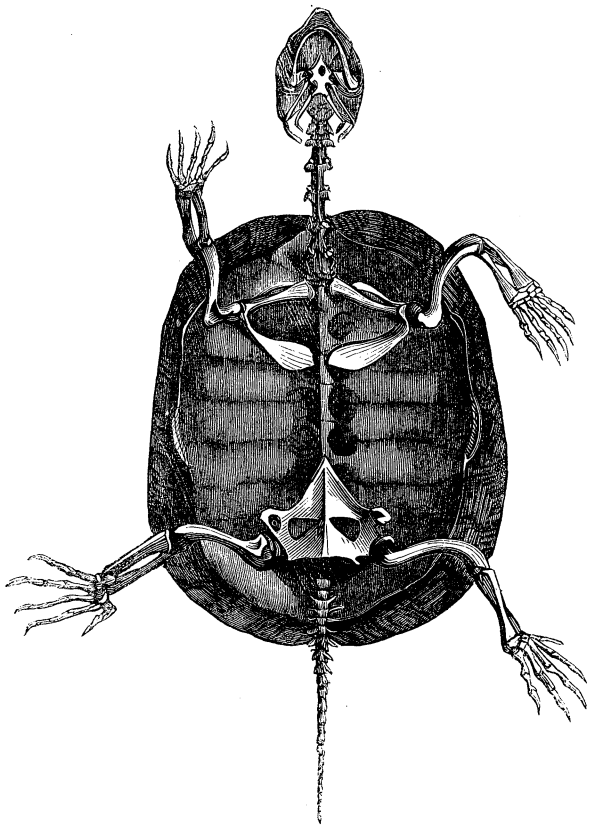
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there are some not fecundated until after they have been excluded; but it is otherwise with the animals of this class; in some of them, as the snakes, for instance, the young are already considerably advanced within the egg at the time the mother deposits it, and there are some species which may be rendered viviparous by retarding the laying of the eggs.

Reptiles not only present extremely varied forms, but great diversity of character and modes of gait; Cuvier remarks that in their formation nature seems to have tried to imagine grotesque forms, and to have modified in every possible way the general plan adopted for vertebrated animals.

ORDER 1. CHELONIA.

The distinguishing characteristic of the Chelonian reptiles, and the on e whic in fact enables us to recognize them at the first glance, consists in their possession of a complete bony case, within which the head and limbs can generally be more or less completely retracted. This case consists of two large bony plates, the upper one, which is more or less convex, being called the *Carapace*, while the lower one, which is flat, is denominated the *Plastron*. These two plates are united at their lateral margins, leaving an anterior and posterior aperture for the protrusion of the head, tail, and limbs. At first view it would seem impossible to refer these singular animals to the ordinary vertebrate type, but a little examination of their anatomy, as represented by the annexed engraving, shows that their different parts are only modifications of the same general structure that we have seen to prevail throughout the preceding groups.



SKELETON OF A TURTLE.

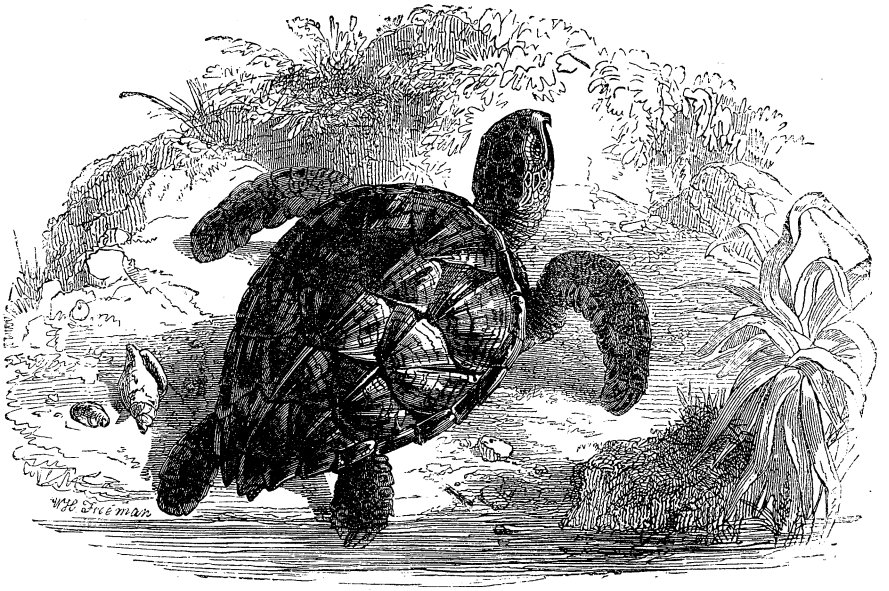
In their general internal structure the Chelonia agree pretty closely with the other reptiles. The heart is composed of three cavities, the partition between the ventricles being very incomplete, so that the venous and arterial blood can mix freely in that cavity. The lungs are of very large size, and extend far into the cavity of the body; but as the ribs are immovable, respiration is effected by a process very analogous to swallowing. The tongue is short, fleshy, and completely movable; the ears are distinctly visible, and the eyes well formed, and furnished with movable lids.

The Chelonian Reptiles are usually sluggish and inactive animals, the slowness of the terrestrial species being even proverbial. They are, however, exceedingly tenacious of life; they will live for a long period without any nourishment, and will even continue to give signs of life for some time after they have been deprived of their heads. They are found principally in the warmer regions of the earth, where they generally subsist upon vegetable substances, although many of the aquatic species also devour small animals. They are oviparous, and the eggs are covered with a hard shell.

This order, called *Testudinata* by many naturalists, is divided into five families: the CHELO-

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NIIDÆ, or *Sea-Turtles;* the TRIONYCIDÆ, or *Soft Tortoises;* the CHELYDIDÆ, resembling the preceding; the EMYDIDÆ, including the *Terrapins*, and generally distributed over the globe; and the TESTUDINIDÆ, or *Land-Tortoises*, familiar to all.



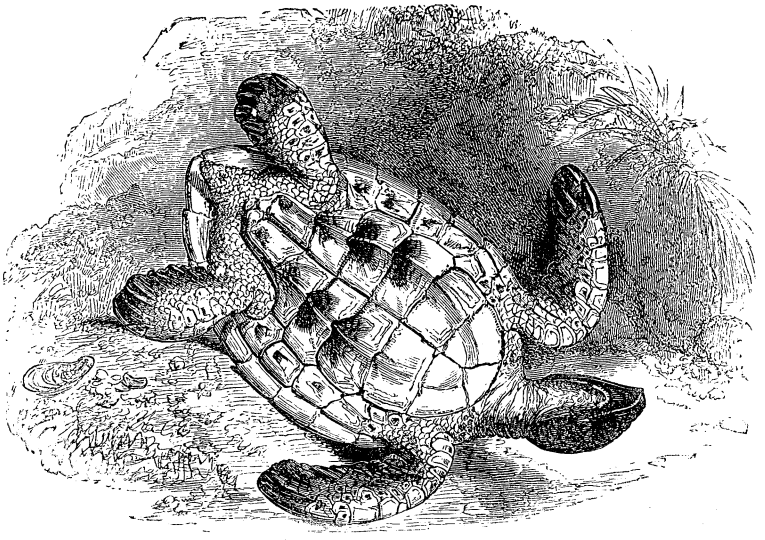
THE IMBRICATED TURTLE ON LAND.

THE CHELONIIDÆ.

These, which are the true *Turtles*, are pre-eminently aquatic in their habits; the limbs are all converted into large, flattened, fin-like organs, the toes being completely concealed by a common skin. The anterior pair of members is always considerably longer than the posterior, and both the anterior and posterior limbs are frequently furnished with one or two nails on the outer margin, which, however, sometimes disappear as the animal increases in age. The bony case of these animals is too small for the reception of the head and limbs, and these parts are, consequently, always more or less protruded. The head is flattened above, and the jaws are horny, very sharp, and beak-like. They are all inhabitants of the sea. They are excellent swimmers, and rarely approach the shore except for the purpose of depositing their eggs, which they do upon sandy coasts. Most of them feed upon sea-weeds; but a few also devour mollusca and other small marine animals. The flesh of the former affords a wholesome and delicious food, and they are in consequence much sought after, and imported into Europe and America in considerable quantities, while the carnivorous species are disagreeable, and even unwholesome, or according to some writers, poisonous, and they are only collected for the sake of the abundant supply of oil which they yield.

Genus CHELONIA: *Chelonia.*—To this belong several species, the best known of which is the GREEN TURTLE, *C. midas*, found abundantly in the seas of warm climates; it is also occasionally met with as far north as the coasts of Great Britain, in Europe, and of Long Island, in America. Those captured in the waters of the latter are occasionally seen in the markets of New York. In tropical regions it attains a length of five or six feet, and a weight of five to six hundred pounds; its flesh is exceedingly delicate, and, when not rendered indigestible by the ingenuity of cooks, is a very wholesome food. The eggs of this, and indeed of all the species of turtles, are also eaten, and considered a great delicacy. At the island of Ascension, where these animals appear to abound to a greater extent than in any other part of the world, they are generally taken by watching them when they visit the shore to deposit their eggs; they are then turned over on their backs, and in this helpless position they remain until their captors, having secured

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THE IMBRICATED TURTLE OVERTURNED.

as many as they require in the same manner, carry them off to their ships. These turtles are often seen in the waters of the West India Islands, in the Gulf of Mexico, on the Atlantic coasts of America and Africa, and in various parts of the Pacific and Indian Oceans; when not engaged in feeding, they float on the water, sometimes many miles from land; they are then apparently asleep, and are easily approached and captured. Audubon gives the following interesting account of the manner in which the female deposits her eggs, which he appears to have observed along the coast of Florida.

"On first nearing the shore, and mostly on fine moonlight evenings, the turtle raises her head above the water, being still distant thirty or forty yards from the beach, looks around her, and attentively examines the objects on shore. Should she observe nothing likely to disturb her intended operations, she emits a loud, hissing sound, by which such of her many enemies as are unaccustomed to it are startled, and so are apt to remove to another place, although unseen by her. Should she hear any noise, or perceive any indications of danger, she instantly sinks, and goes off to a considerable distance; but should every thing be quiet, she advances slowly toward the beach, crawls over it, her head raised to the full stretch of her neck, and when she has reached a place fitted for her purpose, she gazes all around in silence.

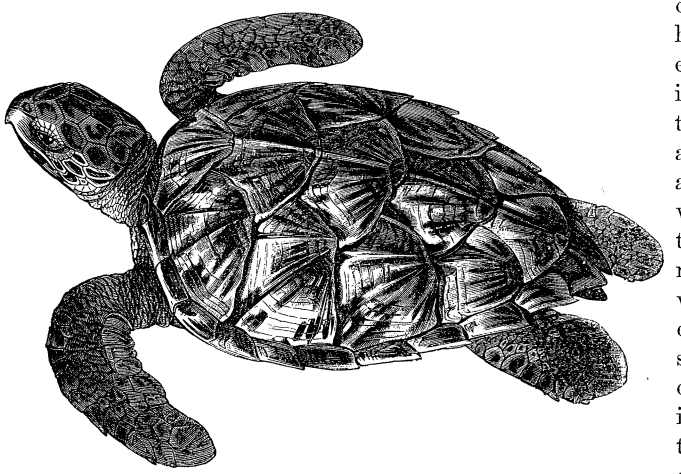
"Finding 'all well,' she proceeds to form a hole in the sand, which she effects by removing it from *under* her body with her hind flappers, scooping it out with so much dexterity that the sides seldom if ever fall. The sand is raised alternately with each flapper, as with a large ladle, until it has accumulated behind her, when, supporting herself with her head and fore part on the ground fronting her body, she, with a spring from each flapper, sends the sand around her, scattering it to the distance of several feet. In this manner the hole is dug to the depth of eighteen inches, or sometimes more than two feet. This labor I have seen performed in the short period of nine minutes. The eggs are then dropped one by one, and disposed in regular layers to the number of a hundred and fifty, or sometimes nearly two hundred The whole time spent in this part of the operation may be about twenty minutes. She now scrapes the loose sand back over the eggs, and so levels and smooths the surface that few persons on seeing the spot could imagine that any thing had been done to it. This accomplished to her mind, she retreats to the water with all possible dispatch, leaving the hatching of the eggs to the heat of the sand.

"When a Turtle, or Loggerhead, for example, is in the act of dropping her eggs, she will not move, although one should go up to her, or even seat himself on her back, for it seems at this moment she finds it necessary to proceed at all events, and is unable to intermit her labor. The moment it is finished, however, off she starts; nor would it then be possible for one, unless he were as strong as Hercules, to turn her over and secure her.

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"Each turtle has generally three layings in the season, at intervals of two or three weeks. The eggs are perfectly round, varying from two to three inches in diameter. The external membrane is flexible, very white, and contains a considerable quantity of calcareous matter."

The Hawk's-Bill Turtle, *C. imbricata*, receiving its popular name from the curved and pointed form of the upper jaw, rarely exceeds three feet; its flesh is unwholesome, but as it furnishes the well-known *Tortoise-Shell* of commerce, it is much sought after. Although the greater number of the whole order of Chelonia have the back and sternum covered with horny plates or scales, it is almost exclusively those of the present species which are applicable to the purposes of art. The thirteen plates with which the whole upper part of the shell is covered, are in fact much thicker and stronger, as well as more beautifully clouded, than those of any other species, and as they lie in what is called an *imbricated* form—that is, one over the other like the tiles of a house, so that at least one-third of each envelops the one behind it—they are much larger in comparison with the size of the individual. In their preparation the scales or plates are, in the first place, separated by the application of heat; they are thus sold to the manufacturers in the rough state, in which they are uneven, fragile, opaque, and dirty, and it is the first object of the artificer to obviate these defects. The uneven surface, the irregular curvature, the unequal thickness of different parts, have all to be corrected, and not only can these objects be readily effected, but the substance can be rendered ductile, compressible, capable of receiving any impression, of being carved, moulded, and polished, and even extended, by soldering pieces together by means of their own substance reduced to powder. The whole of these processes are performed by means of heat.



THE IMBRICATED TURTLE AT SEA.

The uneven curvature is first of all to be removed, and the plate rendered perfectly flat. This is effected by immersing it in hot water, and then allowing it to cool under heavy pressure between smooth blocks of wood or metallic plates. The surface is then rendered smooth and the thickness equal, by scraping and filing away the rough and prominent parts. In this way, each plate receives an equal and smooth surface. But it is in many cases desirable to employ larger pieces than can be obtained from single plates, and two pieces are then united together in the following manner: the edges are beveled off to the space of two or three lines, and the margins, when placed together, overlap each other to that extent. They are then pressed together by a metallic press, and the whole is submitted to the action of boiling water; by this means, the two pieces are so perfectly soldered together as to leave no indication of the line of union. By the application of heat, also, the tortoise-shell may be made to receive any impression, by being pressed between metallic moulds.

No portion of this precious substance is lost or useless. The filings and powder which remain after these and the other processes to which the shell is submitted, are placed with any small fragments in metallic moulds, and by means of pressure, exercised while they are exposed to the heat of boiling water, are formed into plates of any thickness which may be required.

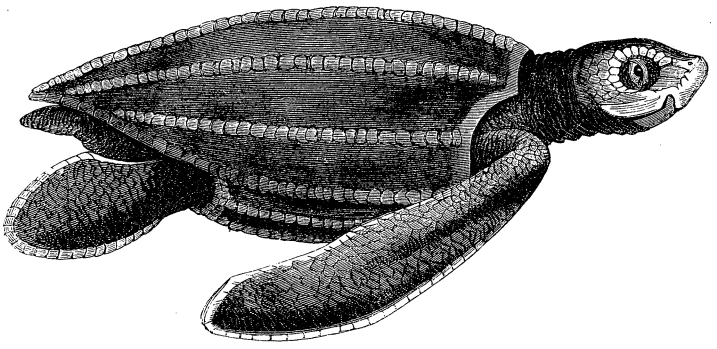
This species is found in the tropical seas, and occasionally strays into the Mediterranean; it is also common in the Gulf of Mexico. Those which produce the finest shell are taken in the waters of the Indian Archipelago.

The Loggerhead Turtle, *C. caretta*, is the largest of the genus, sometimes weighing eleven

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hundred pounds, though half that weight is the more common size. In some cases, the inhabitants of the countries where these animals are abundant, convert their shells into boats, drinking-troughs for cattle, coverings for huts, and baths for children. This species is exceedingly voracious, and feeds on mollusca, the shells of which it crushes between its powerful jaws. Its flesh is worthless, and its eggs are somewhat musky. It however furnishes an oil that burns well. It is found in tropical seas, and not unfrequently in the Mediterranean.

Genus SPHARGIS: *Sphargis.*—To this belongs the LEATHERY TURTLE, *S. coriacea*—*Tortue luth* of the French—remarkable for having the surface of the shell covered with a leathery skin instead of the usual horny plates. It sometimes attains a length of eight feet, and weighs a thousand pounds. It feeds on fish, mollusca, and sea-plants. Lacépède supposes that the shell of this animal was employed by the ancient Greeks for the formation of their lyres, and hence it is called *Testudo lyra* by Bechstein and others. It is a great wanderer; it breeds on the Tortugas and Bahamas, and is occasionally seen on the coasts of New York and Massachusetts, as well as those of England and France, and is sometimes met with in the Mediterranean. Its flesh is not fit for food. De Kay says: "We are not in possession of sufficient evidence to determine whether the large Leather Turtle seen in the Pacific and Indian Oceans belongs to this species."



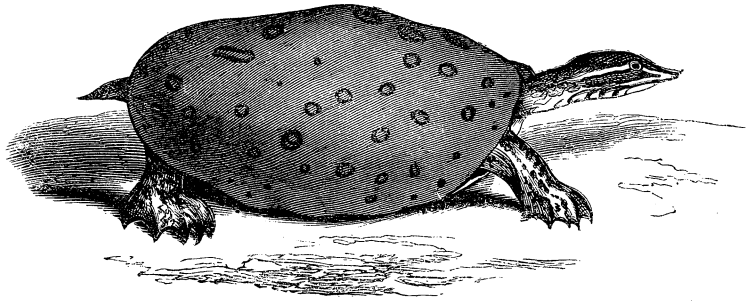
THE LEATHERY TURTLE.

THE TRIONYCIDÆ OR SOFT TORTOISES.

In these the carapace, which, as well as the plastron, is cartilaginous, is still more incomplete than in the turtles, the ribs being only expanded and united at the base, and running out to the margin in the form of the spokes of a wheel. This imperfect carapace is covered with a tough, leathery skin, which is flexible at the margin, and, as in the turtles, the head and limbs are incapable of being retracted within the case. The head is rather small, and pointed in front; the neck is long; the horny jaws are covered with fleshy lips, and the nostrils are produced into a short, cylindrical trunk. The feet are all short and strong, furnished with five toes which are united by a strong web, of which three on each foot are furnished with claws.

The Soft Tortoises live in the rivers of the warmer parts of Asia and Africa, and species are found in the North American waters. They are active, predaceous animals, feeding principally upon fish, but occasionally concealing themselves among the reeds and sedges of the banks, whence they rush out and seize birds and small reptiles.

Genus TRIONYX: *Trionyx.*—This includes the SOFT-SHELLED TORTOISE, *T. ferox*, principally known in the rivers and lakes of the West and South; it is, however, met with in the lakes of Western New York, and is common in Lake Ontario. In the Southern States it is said to destroy great numbers of young alligators. It seizes its prey, which consists of fish and small



THE SOFT-SHELLED TORTOISE.

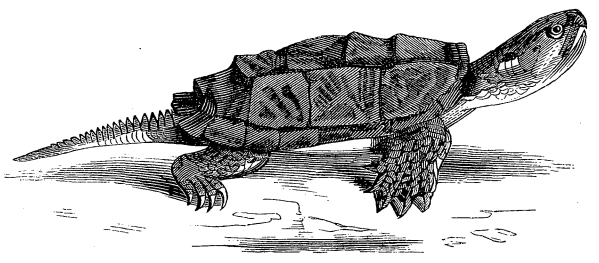
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aquatic reptiles, by suddenly darting forth its long neck. The average length of this species is nine inches, including the head and tail.

Other American species are the *T. muticus*, found in the Ohio River; the *T. Bartrami* and *T. Harlani*, both found in East Florida.

The EGYPTIAN TORTOISE, *T. Niloticus*, is said to destroy great numbers of young alligators.

Genus CHELONURA: *Chelonura*.—This includes the well-known SNAPPING-TURTLE, *C. serpentina*, common throughout the United States. The length of the shell is nine inches; total length fifteen: this species is, however, often much larger; Holbrook mentions one four feet long. It inhabits alike clear and muddy, but generally deep waters; lays its eggs in a hole which it scoops out in the sand; feeds on frogs and fishes, and snaps greedily at the legs of ducks in a pond, dragging them under the water to be devoured at leisure. Its propensity to snap at every thing within its reach has given it its common popular name; it is sometimes called *Loggerhead*, *Alligator-Turtle*, and *Couta*. The eggs, as well as the flesh, are excellent food, though the old tortoises are rather musky. The head is large, but can be drawn under the shell; the tail is long, scaly, and pointed; the fore-legs are large and warty; the shell is deep ash-color. Another species, the *C. Temminckii*, is found in Mississippi.

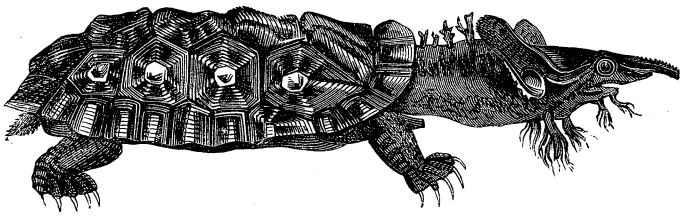


THE SNAPPING TURTLE.

THE CHELYDIDÆ.

This family presents a general resemblance to the preceding; the head and neck are capable of being retracted to some extent beneath the carapace, which is covered with horny shields. The head is broad and depressed, and the nose usually prolonged into a proboscis. Like the soft turtles, they live in the ponds, lakes, and rivers of warm climates, where they feed principally on fish.

Genus CHELYS: *Chelys*.—This includes the MATAMATA TORTOISE, *C. Matamata*, of South America, common in Guiana, and sometimes attaining seventy pounds weight. During the night, and when they believe themselves to be secure from danger, they come to repose on the islets, the rocks, the fallen trunks of trees upon the banks, or floating timber, whence they precipitate themselves into the water at the sight of man, or at the least alarming noise. They are very voracious and agile, and pursue their prey as they swim, consisting of reptiles, more especially young crocodiles and also fishes. On the neck and head there are several membraneous lobes, which give them a hideous appearance. Their flesh being esteemed, they are angled for with a hook and line, baited with small fish or living animals, or with a dead bait, to which the angler gives motion and apparent life; for they are said never to approach a dead and immovable prey. When they would seize their food or defend themselves, they dart out their head and long neck with the rapidity of an arrow. They bite sharply with their trenchant beak, and do not let go till they have taken the piece out on which they have seized; so that their bite is much dreaded, and the fishermen generally cut off their heads as soon as they have caught them.

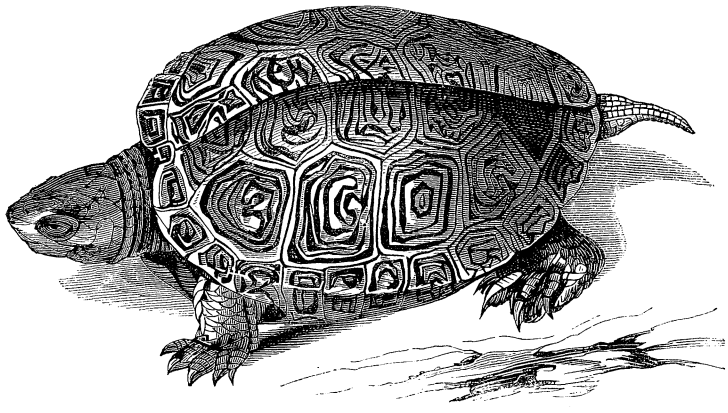


THE MATAMATA TORTOISE.

THE EMYDIDÆ.

This is a very extensive family, generally distributed over the globe. The carapace is completely ossified, and its bones united by sutures; the jaws are horny, and destitute of lips,

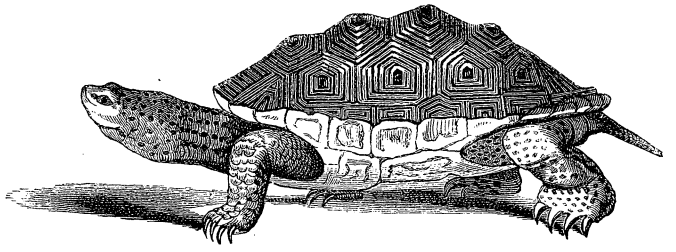
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THE SMOOTH TERRAPIN.

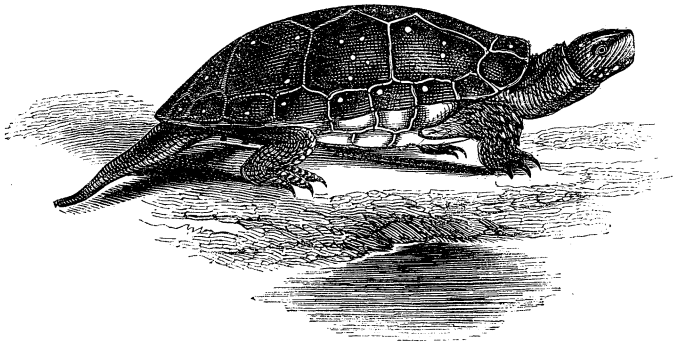
and the head and neck can be completely retracted within the shell. The nostrils are placed at the apex of the snout, but are not prolonged into a proboscis. They are chiefly aquatic, but move well upon the land, and feed upon small fishes and aquatic insects. They are most abundant in warm climates, but some species are found in North America, and also in Europe. By some naturalists the Box-Tortoises are included in this family, but we shall notice them among the Land Tortoises.

Genus EMYS: *Emys.*—Of this, one of the best known species in this country is the SALT-WATER TERRAPIN, *E. palustris:* the shell five to seven inches long; color a dull brown; found exclusively in salt or brackish streams near the sea-shore. It buries itself in the mud during the winter, from which it is taken in great numbers, being then very fat. This is the celebrated terrapin of the epicures. It is found on Long Island, and abundantly on the coast further north. The SMOOTH TERRAPIN, *E. terrapin*, seven or eight inches long, is similar to the preceding, and is valued for the table; found from Rhode Island southward along the coast.



THE SALT-WATER TERRAPIN.

The PAINTED TORTOISE, *E. picta*, is from five to nine inches long; a very handsome species, found in fresh waters, timid and inoffensive, ranging from Lake Superior to Georgia. Though sometimes eaten it is not greatly prized.



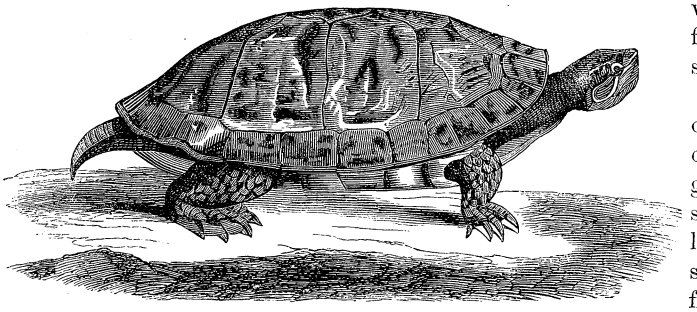
THE SPOTTED TORTOISE.

The SPOTTED TORTOISE, *E. guttata*, is three to four inches long; black, with rounded spots above; beneath varied with black and yellow; sometimes takes to the land, and feeds on worms and insects; it is often called *Speckled Tortoise*; found throughout the Union.

The RED-BELLIED TERRAPIN, *E. rubriventris*, is ten to seventeen inches long; color dusky, with reddish spots, above; beneath red; common in New York and the neighborhood; the flesh is good, and it is often brought to the markets.

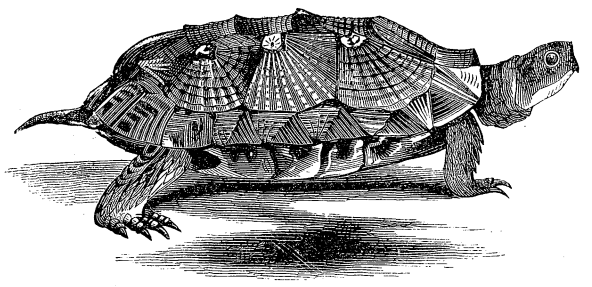
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The Wood-Terrapin, *E. insculpta*, is eleven inches long; color brown tinged with reddish, and with radiating yellow lines; it frequents fresh waters, and is sometimes called the *Fresh-Water Terrapin*; but being often met with in woods at a distance from water, the name given above has been bestowed upon it. It is harmless, but when irritated will snap at the offender. Found from Canada to Pennsylvania.



THE RED-BELLIED TERRAPIN.

Muhlenberg's Tortoise, *E. Muhlenbergii*, is four inches long; shell dark brown, with irregular lines of dingy yellow; it is terrestrial, preferring moist places. Found from New York to Pennsylvania.



THE WOOD-TERRAPIN.

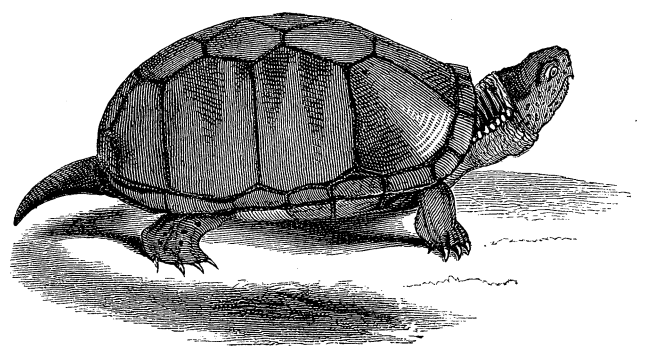
The Geographic Tortoise, *E. geographica*, is ten to eleven inches long; shell olive-brown, with paler meandering lines; common in Western New York.

The Pseudo-geographic Tortoise, *E. pseudo-geographica*, same size as the preceding, and in color much resembling it, is found in the western lakes.

Other species are as follows: the Yellow-bellied Terrapin, *E. serrata*, twelve inches long; found from Virginia to Georgia: the Chicken-Tortoise, *E. reticulata*, ten inches long; found from North Carolina to Georgia: the Florida Terrapin, *E. Floridana*, fourteen inches long; found in East Florida: the Mobile Terrapin, *E. Mobilensis*, thirteen inches long; found in Alabama: the Oregon Terrapin, *E. Oregonensis*, seven inches long; prefers running streams; found in the Oregon River: the Hieroglyphic Tortoise, *E. hieroglyphica*, twelve inches long; found in Tennessee: the Cumberland Tortoise, *E. Cumberlandensis*, five and a half inches long; also found in Tennessee: the *E. concinna*, eight and a half inches long; found in Georgia rivers: the *E. Troostii*, eight inches long; found in the Cumberland River.

It thus appears that fifteen or twenty species of this genus are known and described in the United States, and, according to De Kay, including nearly all the known fresh-water tortoises in America; it is probable that farther investigation will bring others to light, and doubtless the range of many we have noticed will prove to be more extensive than we have indicated.

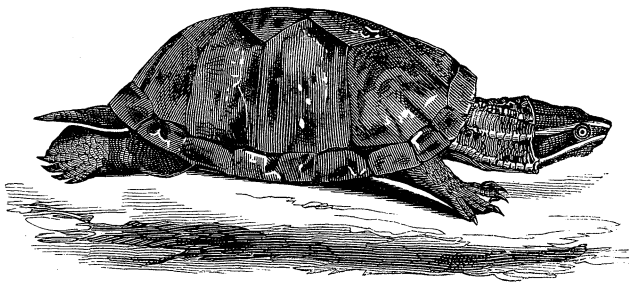
Genus KINOSTERNON: *Kinosternon.*—This includes the Mud-Tortoise, *K. Pennsylvanicum*, six inches long; shell olive-brown; it has a strong musky odor; inhabits ditches and muddy ponds, and will often take the hook; preys on fishes and small aquatic insects; extensively distributed throughout the United States. The plastron is divided into three sections, the first and the last only being movable.



THE MUD-TORTOISE.

Genus STERNOTHERUS: *Sternotherus.*—This includes the Musk-Tortoise, *S. odoratus;* its length is three and a half inches; color usually obscured by mud, but when it is cleaned it appears to be

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THE MUSK-TORTOISE.

of an olive-brown or green color; has a strong musky odor, is very active and vigorous, and is found in most of the ponds and ditches from Maine to Florida. It has the various popular titles of *Musk-Tortoise*, *Mud-Turtle*, *Mud-Terrapin*, and *Stink-Pot*. In this species the plastron is bivalve, the anterior section only being movable.

THE TESTUDINIDÆ OR LAND TORTOISES.

In these the carapace is convex and solid, the ribs being united together throughout their length; the plastron is also solid, the feet short, stout, and somewhat clubbed, the toes being almost entirely concealed under the skin, and terminated by blunt nails, of which there are usually five upon each of the anterior, and four upon each of the posterior feet. The head is rather small, and covered with shields; the jaws are horny, and destitute of lips. The head, limbs, and tail can be completely retracted within the cavity of the shell, and in some cases the plastron is furnished with movable lobes, by which the aperture can be completely closed. The surface of the carapace is covered with horny shields, which touch each other at the edges, and exhibit concentric lines of growth; at the hinder part of the carapace, immediately over the tail, the caudal shields which in the preceding families are usually separate, are here united into a single broad plate. The Land Tortoises are generally of small size. They are terrestrial in their general habits, although most of them can swim immersed in the water. They retire to holes which they find or dig in the earth, and remain in a torpid state through the winter, even in climates where this season is not severe. They are very slow in their movements, and live entirely upon vegetable matter. Like the rest of the Chelonian reptiles, they are far more abundant in warm than in temperate climates. There is no kind of tortoise in the British Islands or in Ireland.

Genus TESTUDO: *Testudo*.—The Common Land Tortoise of Europe, *T. Græca*, is the only species found in that quarter of the world, and there it is not common, except in the southern parts. Its length is eight to eleven inches, and it seldom weighs over three pounds. It lives on roots, fruits, and insects. The flesh is extensively used in Greece. The eggs, about five in number, the size of those of a pigeon, are laid in June. The upper shell is composed of thirty-six parts or plates; it is convex, and so strong that a cart may pass over it without injuring it. This species is very tenacious of life; one kept in the garden of Lambeth Palace, near London, lived to the age of one hundred and twenty years, and other cases are recorded of still greater longevity. In winter, even in warm climates, it retires to some hole or cavern, where it remains till spring, imbedded in grass, leaves, or moss. It is common around the Mediterranean, as well in Africa as Asia. Forbes, in his Travels in Asia Minor, says: "Among Lycian reptiles, the tortoise is the most conspicuous and abundant. The number of these animals straying about the plains, and browsing on the fresh herbage in spring, astonishes the traveler. In April they commence love-making. Before we were aware of the cause, we were often surprised, when wandering among ruins and waste places, at hearing a noise as if some invisible geologist was busily occupied close by, trimming his specimens. A search in the direction of the noise discovered the hammer in the shape of a gentleman tortoise, who, not being gifted with vocal powers, endeavored to express the warmth of his affection to his lady-love by rattling his shell against her side. The ardor of the tortoise is celebrated by Ælian. In ditches and stagnant waters the

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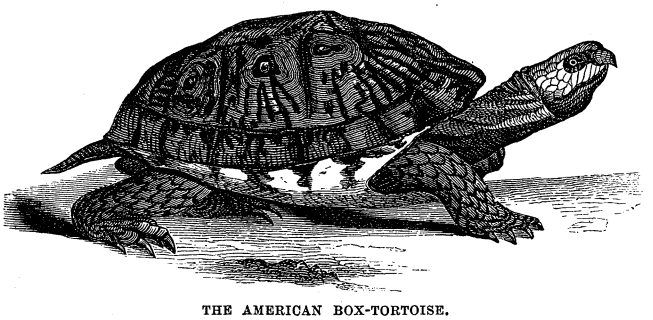
Fresh-Water Tortoise, *Emys Caspica*, is equally plentiful. In fine weather long rows of them may be seen sunning themselves on the banks; whence, on being alarmed, they would waddle and plunge with great rapidity into the water, apparently always following a leader, who made the first plunge from one end of the row."

The Indian Tortoise, *T. Indica*, often grows to the length of three feet. It is found extensively in the warm parts of Asia and the Asiatic Islands. A specimen in the London Zoological Gardens measured four feet four inches. This had lived seventy-seven years in a garden at Port Louis, in the island of Mauritius.

The *Testudo planiceps*, very similar to the preceding, is abundant in the Galapagos Islands. Mr. Darwin says it "is very fond of water, drinking large quantities, and wallowing in the mud. The larger islands alone possess springs, and these are always situated toward the central parts, and at a considerable elevation. The tortoises, therefore, which frequent the lower districts, when thirsty are obliged to travel from a long distance. Hence broad and well-beaten paths radiate in every direction from the wells even down to the sea-coast, and the Spaniards, by following them up, first discovered the watering-places. When landed at Chatham Island, I could not imagine what animal traveled so methodically along the well-chosen tracks. Near the springs it was a curious spectacle to behold many of these great monsters—one set eagerly traveling onward with outstretched necks, and another set returning, after having drunk their fill. When the tortoise arrives at the spring, quite regardless of any spectator it buries its head in the water above its eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The inhabitants say each animal stays three or four days in the neighborhood of the water, and then returns to the lower country. For some time after a visit to the springs, the urinary bladder of these animals is distended with fluid, which is said gradually to decrease in volume, and to become less pure. The inhabitants, when walking in the lower district, and overcome with thirst, often take advantage of this circumstance by killing a tortoise, and if the bladder is full, drinking its contents. In one I saw killed the fluid was quite limpid, and had only a very slightly bitter taste. The inhabitants, however, always drink first the water in the pericardium, which is described as being best." These tortoises are exceedingly numerous in these islands; their flesh is delicate and good. Mr. Darwin says it "is largely employed, both fresh and salted; and a beautifully clear oil is prepared from the fat. When a tortoise is caught, the man makes a slit in the skin near its tail, so as to see inside its body, whether the fat under the dorsal plate is thick. If it is not, the animal is liberated, and it is said to recover soon from this strange operation."

There are several other species of this genus in Asia, Africa, and South America.

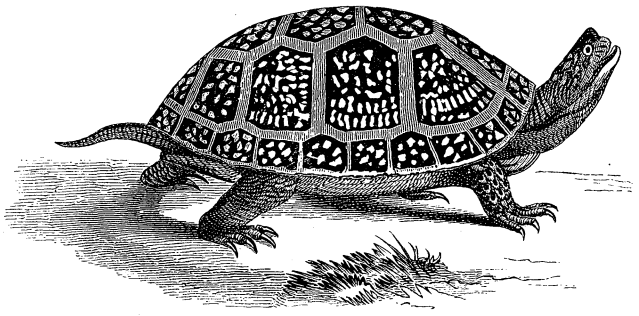
Genus CISTUDA: *Cistuda.*—This includes the *Box-Tortoises*, which are distinguished by a very curious mechanical contrivance. The plastron is divided crosswise into two parts, which are united by a ligament, on which they turn as on a hinge; they are thus able to shut in the head and the limbs. The Common Box-Tortoise, *C. Carolina*, popularly called *Land-Turtle* and *Lock-Tortoise*, has a shell nearly hemispherical, six inches long, dark brown, beautifully stellated with lines, dashes, and confluent blotches of yellow; these figures and colors, however, are variable in form and tint. It is very timid and gentle; feeds on fruit, insects, edible mushrooms, &c.; common on dry land; frequently found in moist places; never takes to the water from choice, and would be drowned if immersed in it for a long time. It is sometimes kept in cellars, from an idea that it drives out the rats; Dr. De Kay put one in his cellar, and found it soon after devoured by the rats. It goes into winter-quarters as early as September. Found from Canada to Florida.



THE AMERICAN BOX-TORTOISE.

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Blanding's Tortoise, *C. Blandingii*, is larger than the preceding; the shell seven to eight inches long; ranges through the Northern and Middle States.



BLANDING'S BOX-TORTOISE.

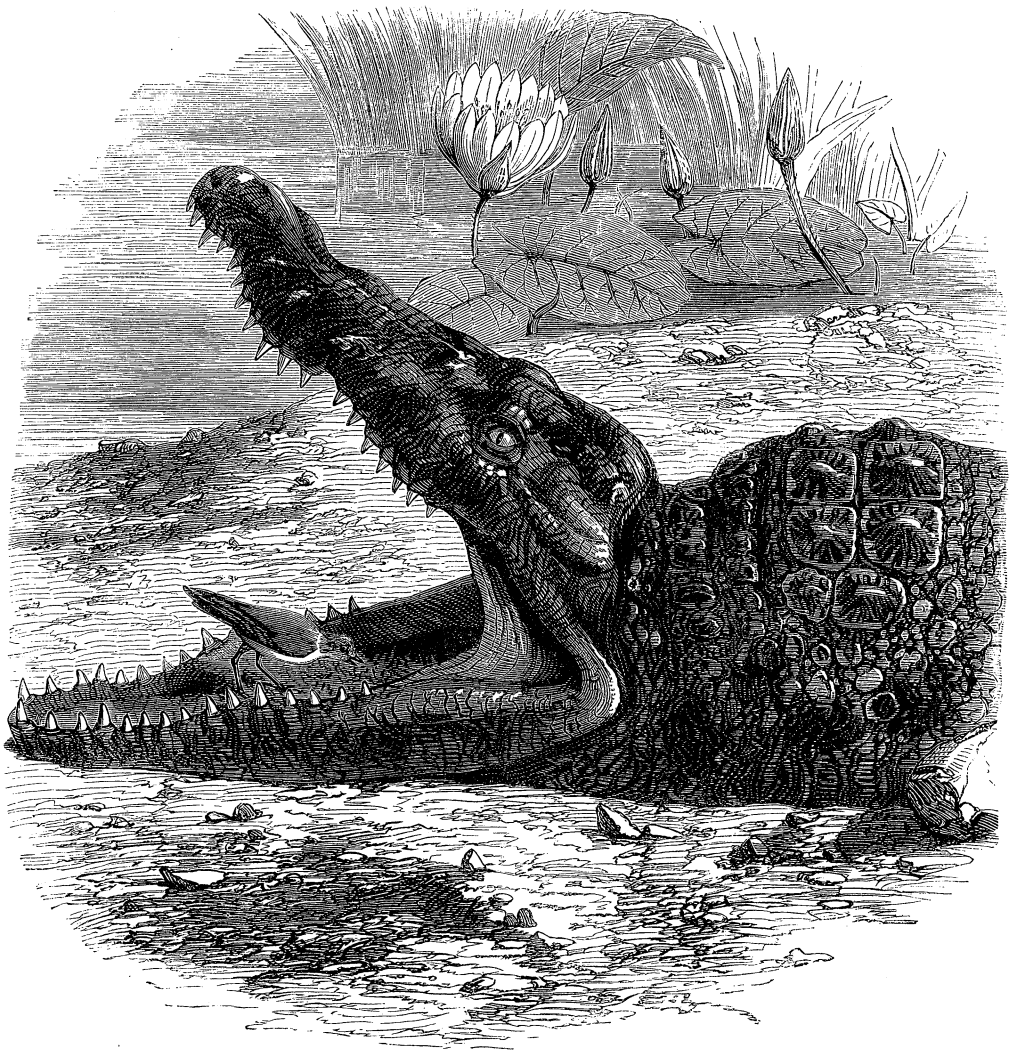
Fossil Tortoises.—Small as the existing species of Tortoises are, it appears that in former periods of the earth's history, at least one species of gigantic size belonging to this family dragged its ponderous bulk over the soil of India; this is the *Colossochelys Atlas*, the remains of which were discovered in the Sewalic Hills of North India by Falconer and Cautley. Those gentlemen think it possible that this gigantic reptile, which measured about eighteen feet in length, existed down to the human era, and that it may thus have given rise to the extraordinary traditions of the Hindoos, which attribute the most important parts in the creation of the world to gigantic tortoises.

ORDER 2. **LORICATA.**

The term *Loricata*, derived from the Latin, signifies *animals covered with a corselet or coat of mail*, and is descriptive of the *Crocodiles* and their allied species. These are marked by a dermal skeleton, composed above of numerous large, square, bony plates, set in the leathery *corium* or hide; the lower parts are covered with wrinkled skin; they have an elongated head; the mouth long, and opening as though both jaws moved, which, however, is not the case; the upper one only is movable with the entire head. The teeth, which are confined to the jaws, are very formidable. These animals are all oviparous; the eggs, being encased with a hard covering, are laid by the females in warm, sandy places, where they are hatched by the sun, the parents sometimes taking no further care of their progeny. They are exceedingly voracious, and abound in the fresh waters of warm climates. Some species hide their prey under water for several days, until it begins to putrefy, when they devour it.

Genus CROCODILE: *Crocodilus*.—Of this there are several species in Africa, Asia, and America, but none in Europe or Australia. The most celebrated is the Egyptian or Common Crocodile, *C. vulgaris*, twenty to thirty feet long; the teeth are numerous, large, conical, and disposed in a single row on each side of the upper and lower jaws; the body is depressed, and covered above with solid, carinated, bony shields; the tail is long and flattened at the sides; gape extending beyond the skull; each fore-foot armed with five claws and the hinder ones with four. Except the elephant, the rhinoceros, and the hippopotamus, the bulk of the crocodile perhaps exceeds that of every terrestrial animal; no fishes frequenting fresh water equal it, and but a few species of those belonging to the seas. The largest are not less than thirty feet in length, and one of only half that size is five feet in circumference; the body stands low on the ground, and the animal universally presents a dull and sluggish aspect. Nevertheless, its motions in pursuit of prey are not slow; and the difficulty which it finds in turning affords the surest means of escape on land; its agility in water is infinitely greater. These facts are better illustrated when the animal is roused to action. Its natural abode is in the water, for scarcely one-fourth of its existence is passed on the earth. The muddy edges and thick reeds of slow and tranquil streams are its favorite haunts; and it sometimes descends rivers to within the flowing of the tide. On leaving them, it advances always with a slow pace, nearly in a straight line, its belly frequently dragging on the ground, and its head commonly elevated. However, it is seldom seen standing, and its chief enjoyment seems to be in lying in a state of absolute quiescence. When in pursuit of prey, it swims gently and silently, just on a level with the water, until it approaches the place where some terrestrial animal comes to quench its thirst. Then curving

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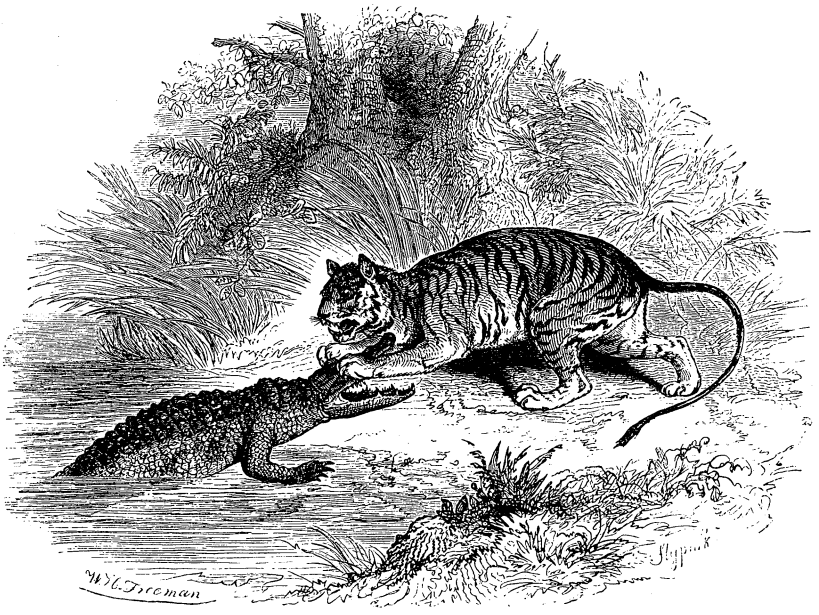


HEAD OF CROCODILE.

its tail, it strikes the animal a violent blow, which is invariably in the direction of the water, and at the same time toward its own mouth.

Should the animal surprised be of large size, such as an ox or a horse, the crocodile adopts another maneuver, in seizing it by the nostrils, and forcibly dragging it under the water to be drowned. When a tortoise is seized, the crocodile raises its head above water, and with the inconceivable strength of its jaws, crushes the shell in pieces. Men, and particularly negroes, are said to be its favorite prey, and it is greedy after the flesh of dogs; and hence, the negroes that hunt the crocodile are accustomed to beat the dogs on purpose that their howling may attract it from its haunts. The prey, being drowned, is conveyed to some sub-aquatic hole or receptacle, and left to putrefy before it is devoured; but the crocodile cannot feed in the water; it would then, as is usually credited, experience the same fate as its victim; therefore, except small fishes, the prey is always carried to the land. Its structure, also, is such, that it must rise to the surface once in an hour, or an hour and a half, for breathing. Nothing that it once seizes can escape; it never quits its hold; even strong levers forced between the jaws for that purpose have proved ineffectual; and, shaking its prey to pieces, it swallows it without mastication. Much

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CROCODILE AND TIGER.

has been said of the stratagems employed by the crocodile to seize its prey: that it lies like a log on the banks of rivers, or floats inactive on the surface, and then springs forward whenever the victim comes within its reach. This may be partly true, though it appears under many exaggerations; for it is well authenticated that it remains motionless until considerable objects are quite close, and evidently within its reach; then it leaps upon them. The agility of the crocodile is not so great, even when in pursuit of prey, that a man may not escape at tolerable speed, more especially by frequent deviations from the straight path. The blow with the tail, suddenly given, is principally to be dreaded, and the irascibility of the animal when attacked, or the female at the head of her young.

Crocodiles are oviparous, and the eggs are but small in proportion to their size, not being quite so large as those of a goose. They are, as is the case with the eggs of reptiles generally, equally thick at both ends; they are covered with an envelope which hardens in the air, but it contains very little carbonate of lime. The males are more numerous than the females, and fierce battles ensue between them in pairing time. These battles of gallantry are generally decided in the water, and they are accompanied by the most dismal bellowing that can possibly be imagined; this noise is said to resemble both that of the bull and the bittern, but to be much louder, and more hoarse and husky than either.

The female digs a cavity in the earth, in which she places her eggs in a circular form, in successive layers, and with portions of earth between, the whole being afterward covered up. The nest is generally placed in a dry hillock, and the earth is gathered up, so that on the average the eggs are about ten inches below the surface. This being done, the mother abandons them to be hatched by the heat of the sun; yet instinct prompts her frequently to revisit the spot as the term of exclusion approaches. She then testifies uncommon agitation, roaming about the place and uttering a peculiar growling, as if to awaken her hideous offspring to animation. The period of maturity being at length attained, the nascent crocodiles answer to her solicitude by a kind of yelping like puppies. A hollow murmur in return denotes her satisfaction, and she hastens to scrape up the earth with such anxiety that several of the young are generally crushed under her unwieldy body.

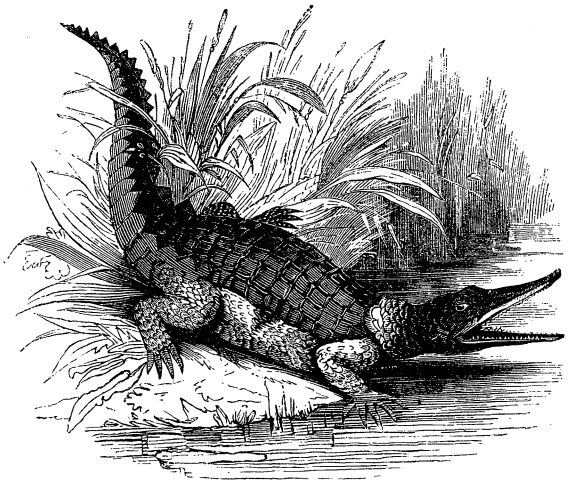
Having withdrawn them from their nest, the mother leads them straightway to the neighboring water; but now her utmost vigilance is required for their preservation, for, unlike the instinct

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with which she is animated, the male, silently approaching, will frequently devour them before she is aware of their danger. He perpetually seeks their destruction; and the watch of the female over her young is protracted for three months from their first appearance. An opinion is prevalent that the crocodile continues growing during its whole existence, that it lives to a great age, and that the utmost limits of its size are scarcely known.

This species is very voracious and powerful, and has frequently made fatal attacks upon human beings. It was held sacred by the Egyptians of the Lower Nile, but was eaten by those at Elephantine. Thirty-six of these were introduced at the amphitheater of Rome by Augustus. Some have supposed it to be the Leviathan of Scripture. Many were kept tame by the ancient Egyptians, and were ornamented with gold rings and precious stones, set in their ears; their feet were garnished with bracelets, and they were thus presented to the veneration of the people. These reptiles were fed on cake and roast meat, and mulled wine was poured down their throats. Herodotus says that a species of plover was wont to enter the mouth of the crocodile to feed on the parasitic worms in its tongue, and that the monster tolerated this, in view of the relief it gave. Modern observation has confirmed this curious account. This species has mostly disappeared from the Lower Nile, and is only common in that river to the south of Middle Egypt. It is, however, abundant in many of the great rivers of Africa.

There are several species of Crocodile in Africa and Asia, generally resembling the preceding: the St. Domingo Crocodile, *C. acutus*, has the muzzle longer in proportion and more pointed than that we have described, but more enlarged at the base. The scaly plates on the back are ranged in four lines. This species is common in the rivers and marshes of Hayti, and most of the other large West India Islands. It has been confounded with the crocodile of the Nile, and also with the alligators of the American continent; its manners are similar to those of the latter, but there are considerable differences in its external structure.



THE CROCODILE.

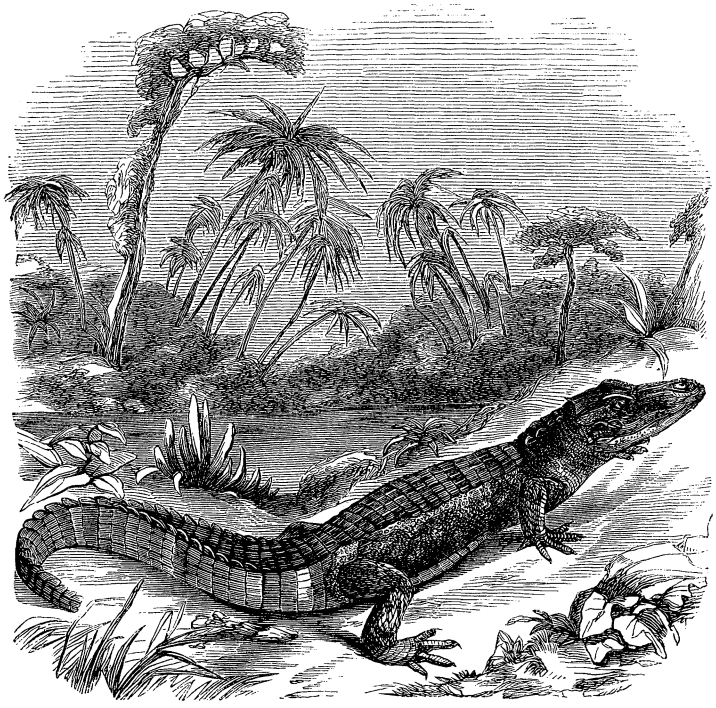
Another species, the Aque Palin, *C. rhombifer*, is found in Cuba.

Genus GAVIAL: *Gavialis.*—Of this there are several varieties, found in Asia. The Gangetic Gavial or Nakoo, *G. Gangetica*, has the jaws produced to an enormous length, forming a long, slender snout, at the extremity of which there is a large cartilaginous protuberance, in which the nostrils are situated. The teeth are very numerous, and nearly equal in size throughout the whole of the jaws. The hind-feet are palmated to the extremities of the toes. This species is found abundantly in the fresh waters of India, where it sometimes attains a length of thirty feet. It is not dangerous to man nor the larger quadrupeds. It was known to the ancients, Ælian mentioning the existence of a crocodile in the Ganges which had a horn at the extremity of its nose. Though, as we have stated, there are several marked varieties, there appears to be but one species.

Genus ALLIGATOR: *Alligator.*—This includes several species, all belonging to the American continent, and called *Alligators* in the United States, *Caimans* and *Jacares* in South America. They resemble the true crocodiles, but there are structural differences which are thus stated by Cuvier: "The alligators have the head less oblong than the crocodiles; its length is to its breadth, measured at the articulation of the jaws, as three to two; the teeth are unequal in length and size; there are at least nineteen, sometimes even as many as twenty-two, on each side in the lower jaw, and nineteen or twenty in the upper. The front teeth of the under jaw pierce through the upper at a certain age, and the fourth from the front, which are the longest of all, enter into

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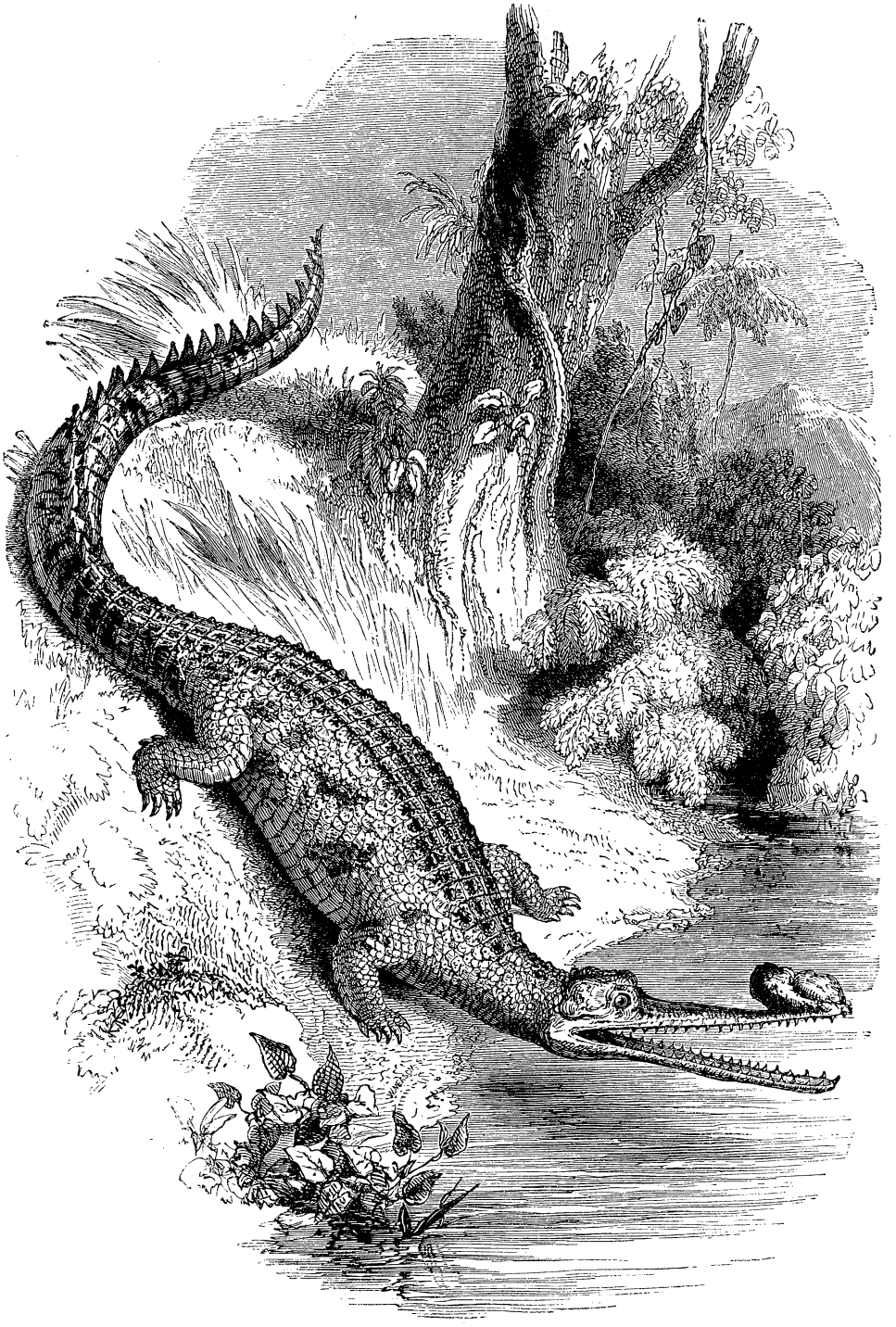
corresponding holes of the upper jaw, in which they are concealed when the mouth is closed. The hind legs and feet are round, and neither fringed nor pectinated on the sides; the toes are not completely webbed, the connecting membrane only extending to their middle; and finally, the post-orbital holes of the cranium, so conspicuous in the true crocodiles, are very minute in the alligators, or even entirely wanting." The crocodiles, properly so called, on the contrary, have the head at least twice as long as it is broad; fifteen teeth on each side of the lower jaw, and nineteen on each side of the upper. The incisor or front teeth, as in the alligators, pierce through the upper jaw at a certain age, but the fourth or largest of the lower jaw, instead of being received into a corresponding hole of the upper, passes into a notch on each side of it; and finally, the hind-feet are bordered by a denticulated fringe, and the toes are completely united by a swimming membrane. Notwithstanding these differences of conformation, the manners of the crocodiles and alligators are very similar, the former, however, attaining a greater size than the latter.



THE ALLIGATOR.

The Mississippi Alligator, *A. Mississippiensis*, sometimes called *Pike-headed Alligator*, inhabits the rivers and lagoons of the Gulf States. It grows to the length of fourteen or fifteen feet, the head being one-seventh of the entire length, and half as broad at the articulation of the jaws as it is long. It appears to be more fierce and voracious than the South American species, often attacks men and quadrupeds while bathing or crossing the rivers, and is said to prefer the flesh of the negro to all other food. During the heat of the day, these animals either lie stretched and languid on the banks, or in the mud on the shores of the rivers and lagoons, and as the other natives of such localities—the winged ones which sport in the sun excepted—are generally at rest at these times, the consequence is, that, during the day, they capture but few animals, excepting such as wander near them. When evening comes, however, they begin to move, and the roaring of the larger ones is terrific. It is described as a compound of the sounds of the bull and the bittern, but far louder than either; and it grates and shivers on the ear as if the ground were shaking. Whether it produces any effect upon the prey of the alligators, in making that prey disclose itself by its efforts to escape, is not known; and, indeed, harsh and terrific as it is,

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THE GAVIAL.

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THE CAIMAN.

it seems not only to be the common noise of the reptiles, but also their love song, which they emit frequently and freely in the pairing season. The history of the pairing is not very complete, but there are some reasons for concluding that they are polygamous. The males engage in fierce though uncouth battles at that season, and not, as has been observed, at any other; and the fair inference is that these are battles of gallantry. They usually take place in the water, though in the shallows rather than the depths; and, at first at least, they are bouts of cudgel-play, rather than battles with the teeth. When it comes to the latter, they are desperate, and the death of one, sometimes of both, is inevitable. It is said that the alligator can give no second bite, and as little is it disposed to leave the first one till the object which it seizes is fairly under water. The jaws close in the same manner as those of the biting turtles, and they can with difficulty be wrenched asunder, even by a lever of considerable length.

On some occasions the alligators beset the mouth of some retired creek, into which they have previously driven the fish, bellowing so loud that they may be heard at the distance of a mile. To catch the fish they dive under the shoal, and having secured one, rise to the surface, toss it into the air to get rid of the water which they necessarily take in along with it, and catch it again in its descent. When, however, they succeed in capturing a land animal which is too large to be swallowed at a single mouthful, they conceal the body beneath the bank till it begins to putrefy, for as their teeth are not formed for cutting or masticating, they are unable to tear the tough flesh in its fresh state; it is then dragged on shore and devoured at leisure.

When about to lay, the female digs a deep hole in the sand, and deposits her eggs in layers, separated from one another by intervening strata of leaves and dry grass. It would appear that she lays only one batch of eggs during the same season, though in the hottest parts of South America, according to Laborde, the caiman of Surinam and Cayenne lays at two or even three different periods of the year; but as each batch is said to consist of only twenty or twenty-five eggs, it is probable that the whole does not exceed the number usually assigned to the common alligator. The female of this latter species, it is said, never loses sight of her nest till the young are hatched, and for months afterward affords them the most unremitting care and protection.

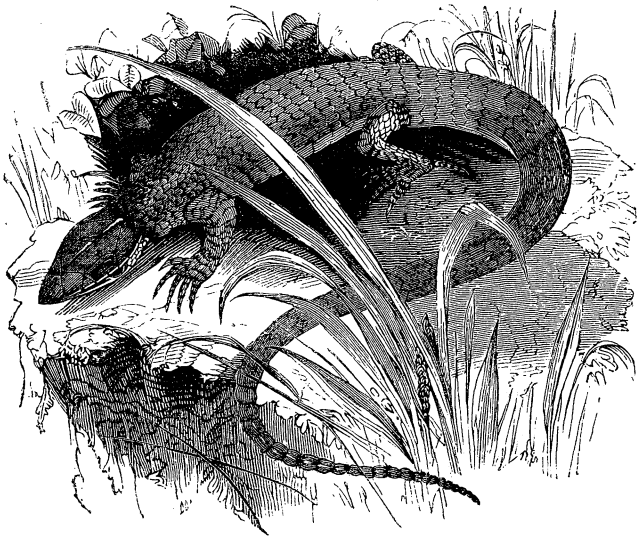
This species is frequently found up the Mississippi, even beyond the Red River. In general, it buries itself under the mud, at the bottom of the swamps and marshes which it inhabits, as soon as the cold weather fairly sets in, and continues in a lethargic sleep till the return of spring. During the very severe frosts, sensation is so completely suspended that the body of the animal may be cut into slices without dispelling his lethargy; yet it is never actually frozen, and the partial return of a few hours' bright sunshine is at all times sufficient to restore suspended ani-

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mation. It is particularly in the rivers, lagoons, and swamps of Florida, Georgia, and Louisiana that the alligator reaches its greatest dimensions. Bartram found immense numbers of alligators and fish in a mineral spring near the Musquito River, in Florida, though the water, at its exit from the earth, was nearly at the boiling point, and strongly impregnated with copper and vitriol.

Genus CAIMAN: *Caiman.*—This includes two or three species, the most noted of which is the COMMON CAIMAN or ALLIGATOR OF SURINAM AND GUIANA, *C. palpebrosus.* It does not attain so great a size as the preceding, nor is it so fierce and voracious. It will not attack a man on the land, nor in the water so long as he moves his legs and arms. The female deposits her eggs in a single layer, covers them slightly with sand, and then leaves them, taking no notice even of the progeny. Other species are the TRIGONAL CAIMAN, *C. trigonatus*, and the SWOLLEN-HEADED CAIMAN, *C. gibbiceps*, both found in tropical America.

Genus JACARE: *Jacare.*—This also includes several species, also called *Jacaré* and *Yacare*, by different authors. They appear to be extensively spread over tropical America, but are most common in the rivers of Brazil. These are never known to attack men or dogs in passing the rivers, unless it should happen to be near the place where they have deposited their eggs; and even then, they do not prey upon the body, but content themselves with the fish and water-fowl which they find so plentiful in their own element. During the night they are exceedingly active, and always keep in the water, showing only their heads above the surface, but toward the middle of the day they come ashore to enjoy the heat of the sun; they then sleep profoundly, but always retreat to the water on being disturbed. The eggs are about the size of those of a goose; they are white, and much sought after by the Indians, who eat them and also the flesh of the animal, though it has a strong musky smell, and scarcely any juice. The female deposits her eggs in the sand in a single layer, and covers them with straw or leaves; few of them, however, escape the quick eye of the vulture, and even many of the young fall a prey to the full-grown males, which at the period of their first appearance, in the hottest part of summer, are particularly fierce and ravenous, the marshes which they inhabit being then dried up, and their food difficult to obtain. The species of *Jacare* or *Yacare* are the BROAD-HEADED YACARE, *J. fissipes;* the YACARE, *J. sclerops;* the BLACK YACARE, *J. nigra;* the SPOTTED YACARE, *J. punctulatus;* and NATTERER'S YACARE, *J. vallifrons.*



THE NIMBLE LIZARD.

ORDER 3. SAURIA.

As a general rule the animals of this order have four well-developed legs, and come under the popular designation of *Lizards;* but there is a considerable number grouped with these which

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do not possess these organs, and might, perhaps, with equal propriety, be classed with the Ophidia. The prominent characteristics of the true Sauria are, that the bones of the upper jaw and the face are firmly attached to the skull, so that they are incapable of any independent motion, and the lower jaw moves only from a single point; both jaws are armed with teeth, generally confined to the jaws; in some the tongue is long, slender, horny, bifid, and inclosed in a sheath, from which it can be protruded at pleasure; in others it is thick, fleshy, and attached to the back of the mouth. The development of the extremities is variable, some being as destitute of external limbs as the snakes; others have them well developed.

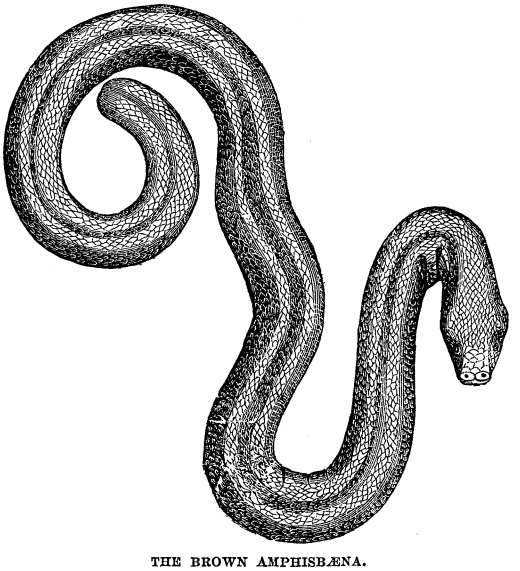
The immense number and great variety of these animals render their classification a matter of some difficulty; we shall not attempt to follow the details of any of the various systems. In our descriptions of species we can give but comparatively few examples; these, however, will convey an adequate idea of the whole. We shall present them under the following heads: the *Typhlopidæ*, *Amphisbænidæ*, *Gymnophthalmidæ*, *Scincidæ*, *Chalcidæ*, *Lacertidæ*, *Ameividæ*, *Varanidæ*, *Geckotidæ*, *Iguanidæ*, *Agamidæ*, and *Chameleontidæ*.

THE TYPHLOPIDÆ.

These creatures derive their name from *Typhlos* and *ops*, words signifying "*having a blind appearance*," and this truly characterizes the family. They are small snake or worm-like animals, nearly cylindrical in form, and quite destitute of limbs; the head is covered with shields, and the tail is short and rounded off at the end; the tongue is long and forked. The eye is reduced to a point, and is scarcely visible through the skin. One species, the *Typhlops braminus*, has the head of the size of the body, and is compared by Cuvier to a small piece of fine pack-thread. Another, the *T. Philippinus*, is eight inches long, of a blackish color, and is entirely blind. These creatures are found in the hot parts of both continents. They live in holes in the ground and under stones, and sometimes bury themselves three feet deep during the rainy season.

THE AMPHISBÆNIDÆ.

The term *Amphisbæna* signifies an "*animal that can walk in both directions*," and is applied to this family because they proceed either backward or forward, as occasion may require. This habit has given rise to the idea that they have two heads, and consequently they have been called *Double-headed serpents*. Many superstitions in regard to them were formerly current; one species which was blind was said to be fed by ants, and was called *King of the Ants*, and their flesh, dried and powdered, was esteemed a cure for broken or dislocated bones.



THE BROWN AMPHISBÆNA.

These creatures have a vermiform appearance; the skin is annulated and divided into square shields by transverse and longitudinal furrows. The head is of the same size as the neck, and the tail is rounded off. The tongue is thick, short, and not sheathed; the eyes are small, destitute of eyelids, and sometimes hidden under the skin; the majority are quite destitute of limbs; they live in the ground, and feed upon insects. The only known species are found in the hot parts of South America.

Genus AMPHISBÆNA: *Amphisbæna.*—This includes the BROWN AMPHISBÆNA, *A. fuliginosa*, eighteen to twenty-four inches long, of a brown color, the body surrounded by over two hundred rings; the eyes covered by a membrane, though the animal is not blind. It lives on worms and insects, particularly ants, in the hills of which it usually conceals itself. It has no fangs, and

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is perfectly harmless. Found in Brazil and Surinam. The WHITE AMPHISBÆNA, *A. alba*, resembles the preceding, and is found in the same localities. The *A. cœca*, found in Martinique, appears to be entirely blind.

Genus CHIROTES: *Chirotes.*—This presents only a single species, *C. lumbricoides*, eight inches long, and found in Mexico.

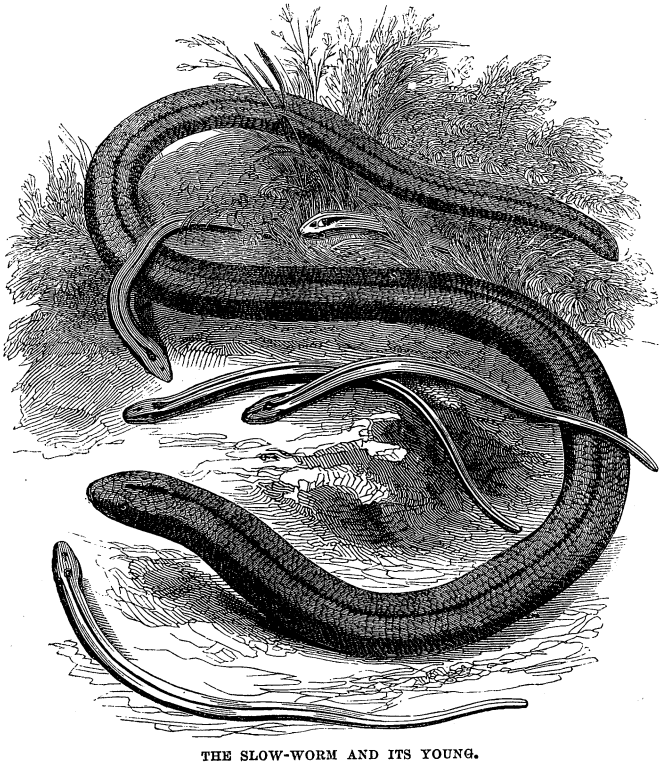
THE GYMNOPHTHALMIDÆ.

This term, signifying *naked eyes*, refers to the fact that the eyes of the family are without eyelids; the body is extremely elongated, and snake-like; the skin is covered with regular scales; the mouth wide; the legs variously developed, some species having four, some two, and some none. The *Gymnophthalmi* have four weak legs; the *Pygopi* have two scale-like legs set far back, and the *Aprasiæ* are entirely destitute of these extremities. These animals are chiefly found in Australia, but one or two are found in Eastern Europe, and one in the West Indies.

THE SCINCIDÆ.

The animals of this family, of which the *Skink*—a species of small lizard—is the type, are furnished with well-formed eyes and distinct eyelids; the limbs are variously developed, some having legs and feet, and others being entirely footless, like snakes and worms.

Genus ANGUIS: *Anguis.*—This includes the SLOW-WORM, *A. fragilis*, common in all Europe, sometimes called *Blind Worm* in England, and *Long Cripple* in Cornwall; the French call it *Orvet.* It appears like a small snake, but its internal structure is that of the lizards. It is twelve to fifteen inches long; feeds on small slugs and earthworms, even those six or seven inches long. In winter it buries itself under leaves or loose soil, and remains torpid till spring. It is harmless and timid, and so brittle that if taken by the tail this extremity separates, and the creature escapes. This brittleness is possessed by many lizards.



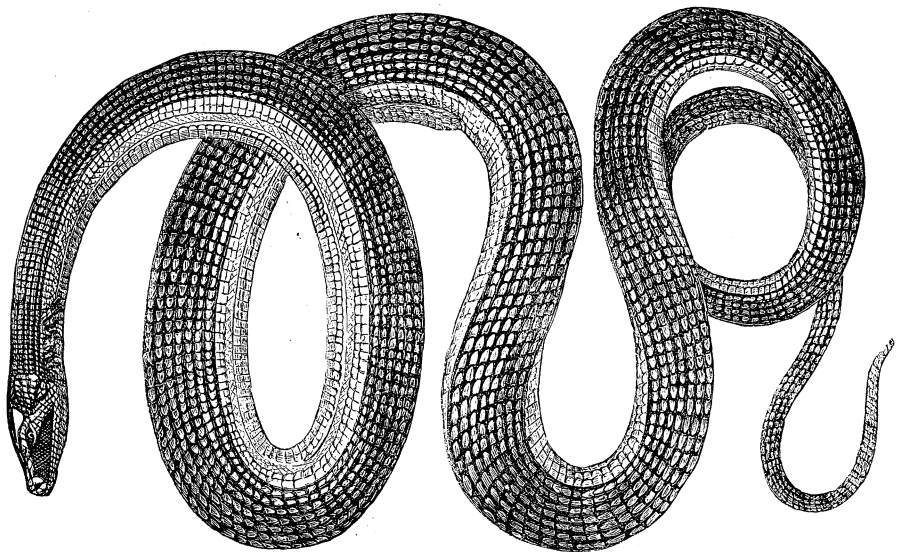
THE SLOW-WORM AND ITS YOUNG.

The GLASS-SNAKE, *A. ventralis* of Linnæus, *Ophisaurus ventralis* of Daudin, is included in this genus by many naturalists. It has, in fact, the head of a lizard, with a serpentine body. Its color is yellowish-green above, marked with black spots; its length about eighteen inches; the skin smooth and shiny. The great peculiarity of this species is, that when struck with a stick it breaks into several pieces, like a fragment of glass. It is perfectly harmless, and is found in the woods of the Southern States.

Genus SCINCUS: *Scincus*, includes the SKINK, *S. officinalis*, nine inches long; it has four legs, and runs with great agility, burying itself quickly in the sand when pursued. The ancients attributed extraordinary medicinal virtues to this animal, which was salted, dried, and sold in the apothecaries' shops. Found in Egypt, Arabia, and Nubia.

The BLUE-TAILED SKINK, *S. fasciatus*—sometimes called the *Striped Lizard*—is six to eight

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THE GLASS-SNAKE.

inches long; color bluish-black; feeds on insects; is often found under the bark of trees, and is perfectly harmless. It is met with from Massachusetts to New York.

Genus CELESTUS: *Celestus*, includes the GALLIWASP, *C. occiduus*, of the West Indies, a small, harmless lizard, though an object of dread to the inhabitants.

Genus PLESTIODON: *Plestiodon.*—To this belongs the *P. erythrocephalus*, which lives in holes of trees, often at a height of thirty or forty feet from the ground, where it frequently takes possession of the deserted nest of a woodpecker. When disturbed, the lizard puts out his head, which is very large and of a bright red color, in a most threatening manner; and when captured, its powerful jaws and strong teeth enable it to inflict a severe wound, although it is not venomous, as commonly supposed. Found in the Southern United States. There are several other species in the Middle, Western, and Southern States.

Genus TROPIDOLEPIS: *Tropidolepis.*—This includes the BROWN SWIFT, *T. undulatus*, five to eight inches long; brown above, beneath green. It is very agile, perfectly harmless, lives in woods, and feeds on insects. It is sometimes called the *Pine-Lizard*, and also the *Brown Scorpion.* Found in the Southern States.

THE CHALCIDÆ.

This family derives its name from a Greek town, *Chalkis.* The same variety of limbs belong to it as to the preceding. Instead of the imbricated, bony scales of the skinks, however, these have the common reptilian scales, arranged in regular transverse rows. The eyelids are always present, the ears exposed, the tongue short, fleshy, and notched at the tip. Species are found in Asia, Africa, Europe, and South America.

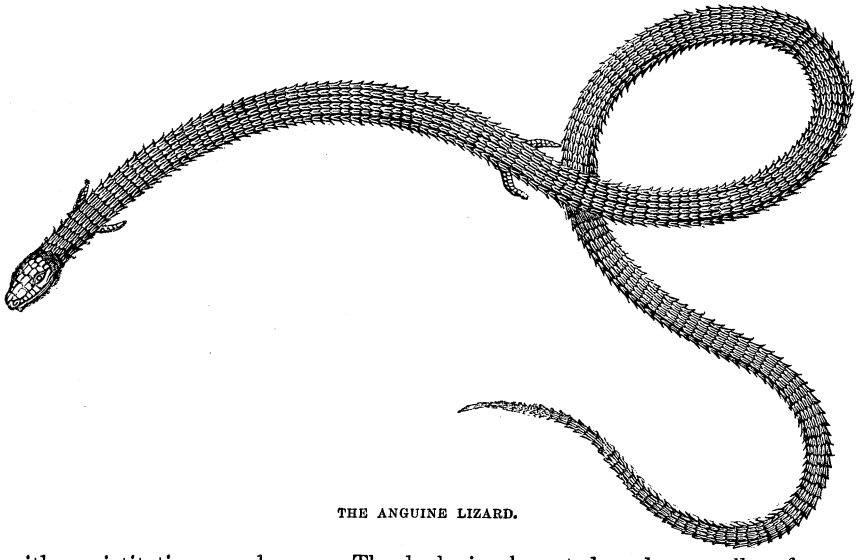
Genus PSEUDOPUS: *Pseudopus.*—This includes the SCHELTOPUSIK, *P. Pallasii*, which has two rudimentary hind-legs; found in Southeastern Europe.

Genus CHAMÆSAURA: *Chamæsaura.*—To this belongs the ANGUINE LIZARD, *C. anguina* —*Lacerta anguina* of Linnæus, and made the type of a distinct family by Dr. J. E. Gray. The body is covered with elongated, keeled scales, in longitudinal series. The feet are four in number, exceedingly small, with a single toe to each. It is found at the Cape of Good Hope.

THE LACERTIDÆ.

These have the body clothed with scales, and the head with large, regular plates; the head is distinctly separated from the neck, which is never furnished with a pouch under the throat, or with any other appendages; the eyes are provided with a pair of movable eyelids, and also

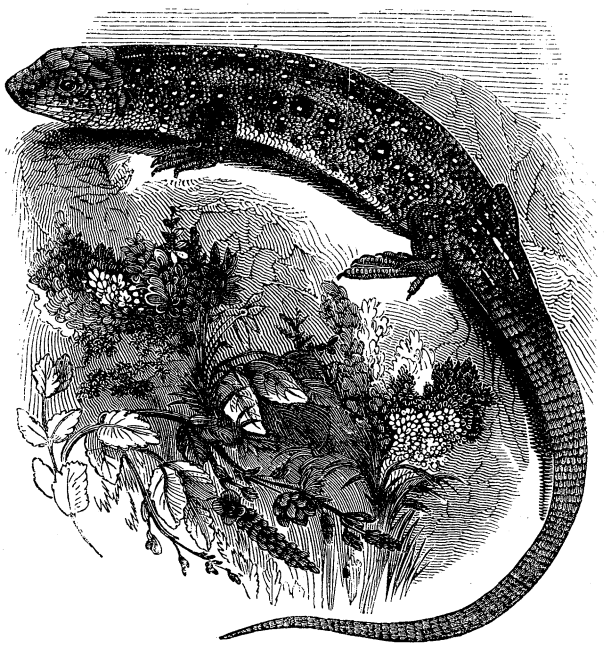
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THE ANGUINE LIZARD.

usually with a nictitating membrane. The body is elongated, and generally of a somewhat cylindrical form, terminated posteriorly with a very long, tapering tail, which is often much longer than the body. The feet are well developed, and generally furnished with five distinct toes of unequal length. The teeth are a little curved, and inserted in a slight furrow of the jaw; they are hollow at the base, and are not very firmly attached to the bone. These Lizards, which must be regarded as the types of the Sauria, are confined to the countries of the eastern hemisphere, over the whole of which they are pretty generally distributed. They feed on insects and worms.

Genus LACERTA: *Lacerta.*—To this belongs the NIMBLE LIZARD, *L. agilis*—the *Sand-Lizard* of England, *Lézard* of the French: it is seven inches long; color brown, though there are green varieties. It inhabits sandy heaths, runs with agility, is very timid, but will attempt to bite when captured. The female lays twelve to fourteen eggs, which she covers with sand, and leaves them to be hatched by the heat. Found in France, England, and the middle countries of Europe; is rare in Denmark and Sweden.



THE SAND LIZARD.

Genus ZOOTOCA: *Zootoca*, includes the COMMON EUROPEAN LIZARD, *Z. vivipara*, six inches long; greenish-brown above; orange beneath, spotted with black. The female of this species, instead of depositing her eggs in the sand and leaving them to be hatched by the heat of the sun, produces them alive, five or six in number, perfectly formed, and capable of at once running about. She however bestows upon them a mother's care for a brief period. This is a graceful and gentle species, and is capable of being tamed. It seems to be confined to Middle Europe; it is found in England, Scot-

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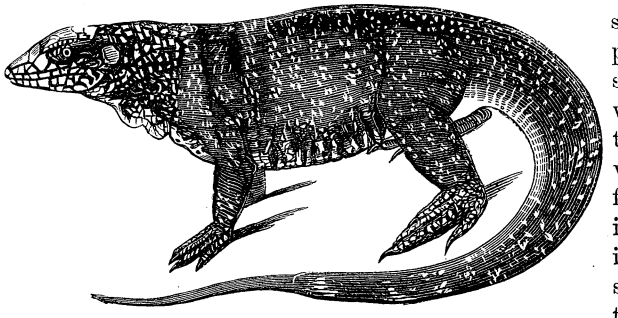
land, and even in Ireland, an evidence that St. Patrick, who has the credit of having destroyed the reptiles in the favored Emerald Isle, must have confined his operations to the venomous species.

The OCELLATED LIZARD, *L. ocellata*, is a very beautiful species, a foot in length, of a fine green color, reticulated and spotted with black, and adorned with blue spots on the side of the body. It is abundant in Italy, Spain, the south of France, and Africa.

THE AMEIVIDÆ.

These, which are American animals, seem to take the place of the Lacertidæ upon this continent. They resemble them in their general characteristics, but differ in having solid teeth, firmly attached to the jaws. They live on the ground in woods and hedges, and feed principally upon insects, though they sometimes devour small vertebrate animals.

Genus TEIUS: *Teius.*—This includes the TEGUEXIN or VARIEGATED LIZARD, found in Brazil and Guiana. It sometimes measures six feet in length, and is very voracious, preying upon mice, frogs, and other small animals; it is said occasionally to visit the poultry-yards, and to feed on the chickens and eggs. Its flesh is white, and not unlike that of a fowl in flavor. When pursued it does not allow itself to be taken without a struggle; it runs with great swiftness, and strikes such violent blows at the dogs with its tail, that they do not readily venture to attack it. When brought to bay, it fights boldly, and inflicts severe bites upon any thing that comes within its reach. It is fond of honey, and attacks the bee-hives with blows of its tail, each time, after having given a stroke, running away to escape the stings. In this way it wearies out the bees, who finally quit their home and leave the honey to their enemy.



THE VARIEGATED LIZARD.

Genus AMEIVA: *Ameiva.*—These are elegant and inoffensive little lizards, abounding in the West Indies; one species is found in the United States, from Carolina to Florida: this is the SIX-LINED LIZARD, *A. sexlineata*, dark brown above, with six yellow longitudinal lines; length twelve inches. A species called *A. tessellata* is said to be found in Arkansas.

THE VARANIDÆ.

These, which are called the *Broad-backed Lizards*, and derive their name from the genus *Varanus*, comprise the largest species of known lizards; they resemble the preceding families in the form of their bodies, and in the constant development of the limbs, but differ from them in having the head and belly covered with scales resembling those of the rest of the body, instead of the shield-like plates which form the clothing of those parts in the Lacertidæ and Ameividæ. The head is elongated, and the tongue, which is very long and distinctly bifid, like that of a snake, is received at the base in a membraneous sheath. The tail is very long, usually compressed and keeled, and the feet large, and furnished with long toes terminated by strong claws. They run swiftly, with a serpentine motion; and feed on locusts, crickets, and beetles, and some of the larger species on the eggs of birds and crocodiles, chameleons, fish, and tortoises.

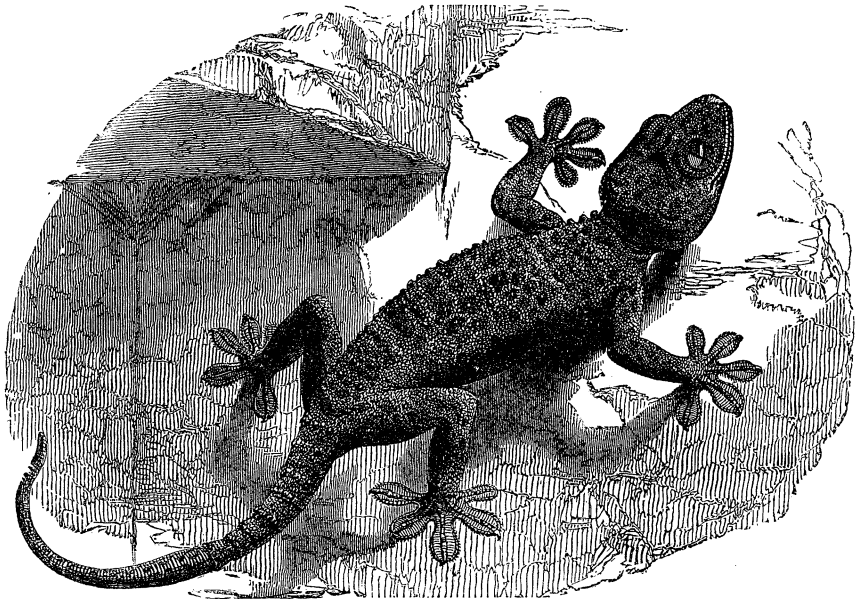
Genus MONITOR: *Monitor*, includes several species. The EGYPTIAN MONITOR, *M. Niloticus*, attains the length of five or six feet; it lives in the neighborhood of water, and is said to devour the eggs of crocodiles; common in Egypt, where the people hold it to be a dwindled crocodile. It is figured on the ancient monuments.

Genus HELODERMA: *Heloderma.*—To this belongs the CALTETEPON, *H. horridum*, which is distinguished by furrowed fangs in the anterior portion of its jaws. It is aquatic in its habits,

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and is found in Mexico, where it is considered venomous, though this is an error. It is the only animal of this family found in America. Dr. Gray arranges it in a separate family, to which he gives the name of *Helodermidæ*.

There are other species of Varanidæ in Europe, Asia, Africa, and Australia, which frequent dry and sandy places. The *Psammosaurus scincus* is found in the deserts of Egypt, and is supposed to be the skink of the ancients.



THE WALL GECKO.

THE GECKOTIDÆ.

These, as well as the succeeding families are called *Thick-tongued Lizards*. Of the present group there are a great many species, distributed in various parts of the world. They have the eyes large and the legs short and terminated by five nearly equal toes; these are destitute of claws, but they are furnished beneath with a peculiar apparatus for clinging, very similar in its action to that by which many insects are enabled to walk upon polished perpendicular surfaces. The lower part of each toe is dilated, forming a sort of disc, the inferior surface of which is composed of numerous transverse, notched laminæ, between which a sticky fluid exudes. By means of this apparatus the Geckos are enabled to run up a perpendicular wall with great facility, and even to cross a ceiling with their backs downward, a power which, no doubt, assists them greatly in the capture of the flies and other insects which constitute their principal food. They are nocturnal animals, and very active, moving about with great rapidity, but without the least sound. They are very abundant in warm climates, especially in Southern Asia. They are generally of a repulsive appearance, and this is no doubt the reason why many of the species are considered venomous, though erroneously so, by the inhabitants of the countries where they are found.

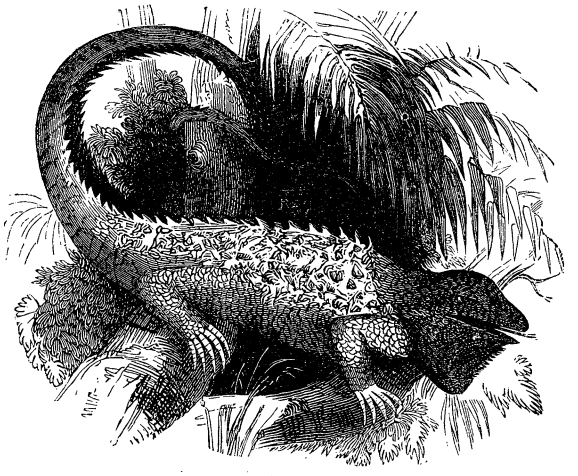
Genus PLATYDACTYLUS: *Platydactylus.*—This includes the WALL GECKO, *P. muralis*—one of the species known in the south of Europe, and inhabiting all the countries bordering on the Mediterranean. It is about six inches long, and receives its specific name from living in the walls of old buildings. The term *Gecko* is said to be derived from the note of one of the species.

Genus THECADACTYLUS: *Thecadactylus.*—This includes the CROAKING LIZARD of the West Indies, *T. lævis*, which frequents the sugar-boiling houses, reposing during the day upon the rafters. It is generally considered venomous, but this is undoubtedly a result of its repulsive appearance.

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THE IGUANIDÆ.

These constitute another exceedingly numerous family. They are frequently of considerable size; the head is unusually broad and flattened, and often furnished with comb-like ridges or membraneous lobes, and similar appendages are usually continued along the back. The throat, also, is almost always furnished with membraneous expansions of some kind; these sometimes constitute large frills on the sides of the neck. The eyes are always furnished with lids, which can be completely closed; the ears are freely exposed, and the tongue is short and thick, and free only at the tip. Many of the species are of the most brilliant green color, but they suddenly change this gay painting on being alarmed, and become of more sober coloring; some of them, under these circumstances become completely black.



THE COMMON IGUANA.

Genus IGUANA: *Iguana.*—This includes the Common Iguana, *I. tuberculata*, which may be regarded as the type of the family; it is a large lizard, which attains a length of four or five feet, and is common in all the tropical parts of America. It is of a greenish color, mottled with a brighter green, and banded with brown on the tail; along the back runs a comb-like crest, and the throat is furnished with a large membraneous expansion, which is also denticulated in front. This reptile is much sought after in the countries where it abounds, its flesh being regarded as a great delicacy, although it is said not to be particularly wholesome. It passes a great part of its existence in trees, and is commonly taken when resting on a branch, by slipping a noose over its head, its captor whistling to it while engaged in the operation. Its teeth have the crowns compressed and serrated, and it lives principally upon fruits and seeds. It is said to take the water freely, and to swim with facility.

Genus BASILISCUS: *Basiliscus.*—The Basilisk, *B. Americanus*, although perfectly harmless, is certainly one of the most hideous of reptiles in its appearance. It is found in South America, and occasionally attains a length of upward of three feet. Instead of the comb-like dorsal ridge of the Iguana, it is furnished with a broad membrane running down the back, and a second, still broader, on the upper surface of the tail, and these are supported by a series of bones, consisting of the elongated spinous processes of the dorsal and caudal vertebræ, and having the appearance of long perpendicular fins.

THE AGAMIDÆ.

These seem to take the place of the Iguanas in the Old World. They are principally inhabitants of the warmer regions of Asia and Australia, and the intervening islands; a few are found in the south of Australia, Van Diemen's Land, and New Zealand, and a few others in Africa, from Egypt to the Cape of Good Hope. One remarkable genus is found in the United States. In their general form, and in the character of their peculiar appendages, they closely resemble the American Iguanas; but some of them are particularly remarkable. One of these is the *Chlamydosaurus Kingii*, which is not uncommon in the neighborhood of Port Essington. The appearance of this lizard is most extraordinary; it is furnished with a curious crenated membrane, forming a sort of frill or tippet round its neck, and covering its shoulders. Each side of this singular appendage is furnished with four cartilaginous plates, by means of which it can be folded

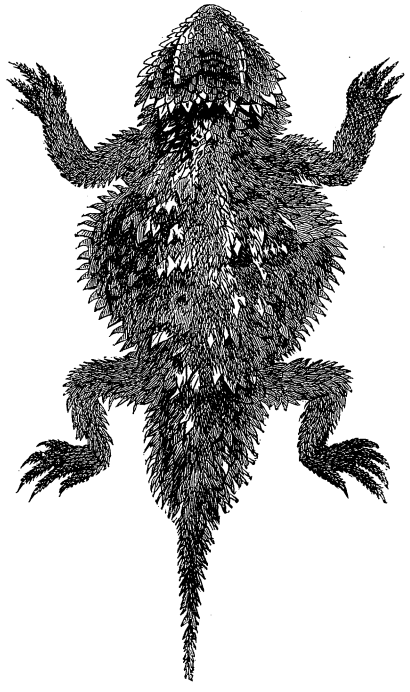
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or extended, in the manner of a fan, at the pleasure of the animal. It measures about two feet in length; it is a bold creature, fighting fiercely when pursued, and always extending its broad ruff when in circumstances of irritation or danger.

A still more remarkable development of the dorsal system is presented by the *Flying Dragons*, of which three species are known in India and the Asiatic Islands. They live on trees, upon which they run about in search of insects, on which they feed. These are furnished with a broad membraneous lobe on each side, supported by six first false ribs, which are extended straight outward from the vertebral column. By the movements of these bones the dragons are enabled to stretch their broad lateral membranes, which thus form a sort of parachute to support them in long leaps from branch to branch. They are, however, quite destitute of any power to strike the air, so that their flight is in fact nothing but a floating through the atmosphere. They are small harmless creatures, seldom exceeding a foot in length.

The flying dragons of the older writers were fabulous creatures, and their descriptions are known to have been, in some instances, founded upon articles manufactured for the express purpose of duping credulous naturalists.

Some other species of the Agamidæ are worthy of notice. Among them we may mention the *Stellio vulgaris*, a common lizard in the Levant, and also in Egypt, where its excrements were formerly collected and used as a cosmetic. Cuvier states that the Mahometans destroy this animal wherever they see it, because, as they say, it insults them by bowing its head in imitation of their motions when engaged in prayer. Another singular species, from Australia, has been described by Dr. Gray under the name of *Moloch horridus*. The whole surface of this lizard is covered with irregular plates and strong acute spines, and the upper surface of the head bears two very large spines. Altogether it is a most hideous-looking creature.



DOUGLASS'S PHRYNOSOMA.

Genus PHRYNOSOMA: *Phrynosoma.*—This includes Douglass's Phrynosoma, *P. Douglassii*, found at Salt Lake Valley, by Captain Stansbury, from whose work we copy the annexed engraving. It is three and a half inches long, and olive-green above. The head is covered with sharp spines or roundish knobs; the body is scattered over with irregular spine-like scales. It is sluggish in its habits, and has some resemblance to a toad, whence this, with other species—of which there are five or six, in California, Utah, and the Southwestern States—are called *Horned Toads.*

THE CHAMELEONTIDÆ.

Genus CHAMELEON: *Chamæleo.*—This is the only genus of the family, but it contains about eighteen known species, all inhabitants of the Old World, and which are, perhaps, the most singular in the whole order of lizards. They are all small animals, with a curious pyramidal, and unusually angular head, distinctly separated from the neck, a short, thick body, which gradually tapers from the region of the shoulders to the point of insertion of the hind-legs, and a short prehensile tail. The mouth is very large; the teeth are firmly attached to the jaws; the ears are entirely concealed under the skin, and the eyes, which are very large and prominent, are closely covered by a circular lid, which is only perforated by a small round opening immediately in front of the pupil. The legs are rather long and slender; the feet are composed of five toes, which, however, are divided into two opposite bundles, and the toes of each bundle are so united

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THE FLYING DRAGON.

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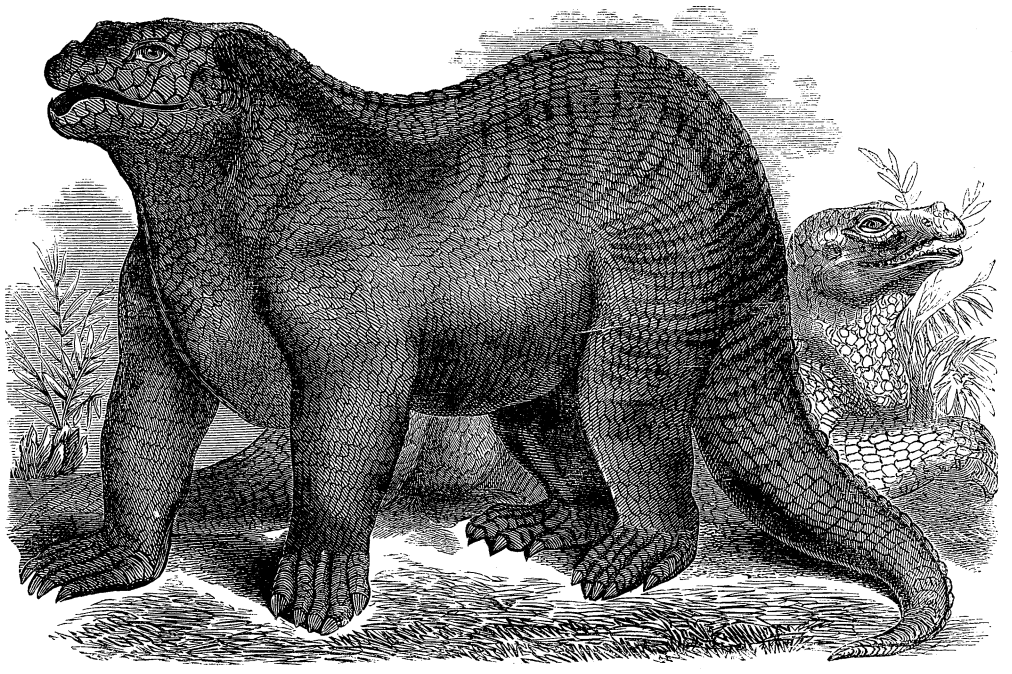
THE COMMON CHAMELEON OF EUROPE.

together by skin, that each foot may be described as forming a hand composed of a single finger and thumb. By means of these grasping organs, aided by their prehensile tails, the chameleons climb about upon shrubs and trees in search of the insects which constitute their sole nourishment, but they exhibit none of that agility which renders many of the other small lizards such interesting objects. All their motions, in fact, are very slow, and give the spectator the idea of the most painful caution; they are very sluggish, and sit for a long time motionless upon a branch, only occasionally giving a scarcely perceptible sign of life, by moving one of the eyes, each of these standing out and being capable of independent motion. The eyes, one often looking one way and the other in a different direction, have a most extraordinary appearance.

At first sight it would appear that a sluggish creature like this would have but little chance of capturing a sufficient number of flies and other insects, the active denizens of the air, which constitute its only diet, to satisfy the necessities of its appetite; but on examination we find that the structure of the tongue of the chameleon is admirably adapted to assist in procuring food. This tongue is composed of a hollow tube, capable of extending itself with the rapidity of lightning to an enormous comparative length; it is terminated by a fleshy knob, which has a cup-like cavity in its anterior surface, and this is always imbued with a viscid secretion. When the chameleon has marked an insect for its prey, it rolls about its strange looking eyeballs, and immediately darts the tongue at it with the most astonishing rapidity, and rarely misses its aim, although the tongue is often protruded to more than twice the length of the whole body of the creature. The fly, or other insect, is of course drawn back with the tongue into the mouth. The difficulty of observing processes which are effected so instantaneously, coupled with the fact that the chameleon can support a very prolonged abstinence without injury, led the ancients to the opinion that this animal was nourished by air alone; and this, which has frequently furnished the poet with similes, is still, to a certain extent, a matter of popular belief.

Another curious subject connected with the chameleon, and which has also been much exaggerated, is its power of changing its color. The variation in this respect appears to be that the animal, under certain circumstances, passes gradually from its natural pale gray color through pale green to yellow and dingy red; and if the exciting cause of the change be continued, it will finally become dusky violet, or nearly black. The cause of this phenomenon is described as follows: beneath the transparent epidermis there is a great quantity of minute, soft granules,

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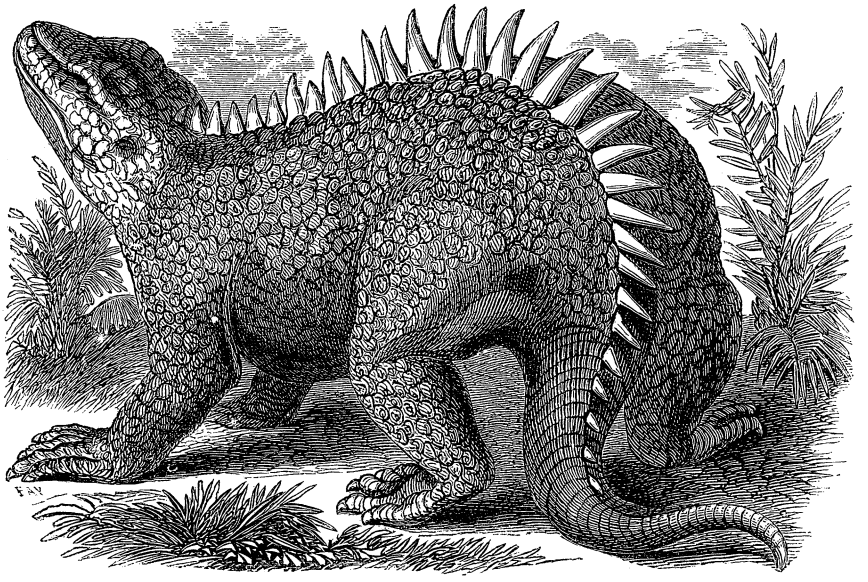
THE IGUANODON.

which bear the different colors; these are more or less extended, according to the quantity of blood that reaches them, and the change of color is thus effected.

There can be little doubt that this is a provision to enable this sluggish animal to approach its prey. "The more we search into the habits and peculiarities of animals," says an eloquent writer, "the more are we led to admire the wisdom and goodness of the Creator. Throughout the animal creation, the adaptation of the color of the creature to its mode of living and place of concealment, is highly remarkable, considered in reference to its preservation. If we look around, we shall discover that the colors of the smaller animals, and a multitude of insects, contribute materially to their safety. Caterpillars which feed on leaves are generally either green, or have a large proportion of that hue in the colors of their coats. So long as it remains still, how difficult it is to distinguish the grasshopper from the leaf or spray on which it rests! The butterflies that flit among the flowers are decked in varied hues like them. The little birds that haunt the hedge-row side have feathers on their backs which harmonize with the color of the leaves, and feathers on their breasts which borrow the white hue of heaven; these render them less visible to the hawk above, or to the prowling cat beneath. The wanderer in the fields almost treads upon the skylark before it rises, warbling merrily to Heaven's gate. The partridge can hardly be distinguished from the stubble amongst which it makes its nest; and it is considered an accomplishment for the sportsman to be able to find the hare sitting. In northern countries, the winter dress of the hare and the ptarmigan is white like the snow.

"If we turn to the waters, we shall find that it is nearly the same with its inhabitants. Frogs vary their color according to the nature of the mud or sand at the bottom of the ponds or streams they frequent; nay, the tree-frog, *Hyla viridis*, takes its name from the color which is so difficult to see among the leaves, where it adheres by the cupping-glass-like process at the end of its toes. The fish, especially those which inhabit fresh-water streams, are distinguished by the same peculiarities. Their backs are comparatively dark, like the water above them, and it requires some practice to discover them as they glide along the bottom of the clear brook in thick dusky shoals. They come like shadows and so depart, under the gaze of the spectator. It is difficult to distinguish the pike—"the ravenous luce," as old Izaak Walton calls it—with its dark-green mottled back and sides, from the similarly-tinted leaves amid which that fresh-water shark lies on the

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THE HYLÆOSAURUS.

watch, as motionless and still as the leaves themselves; and it is even difficult for any eye but that of the practiced angler to discover what shadowy form it is that ripples the whimpled water as the bold old trout sails leisurely up the stream, with his back-fin just peeping above the surface, on the look-out for a May-fly for his luxurious repast."

The COMMON CHAMELEON OF EUROPE, *C. Africanus*—*Caméléon* of the French—is sixteen to eighteen inches long, the tail being nearly as long as the body. It occurs in all the northern parts of Africa, and also in India; it has become naturalized in some parts of the south of Europe.

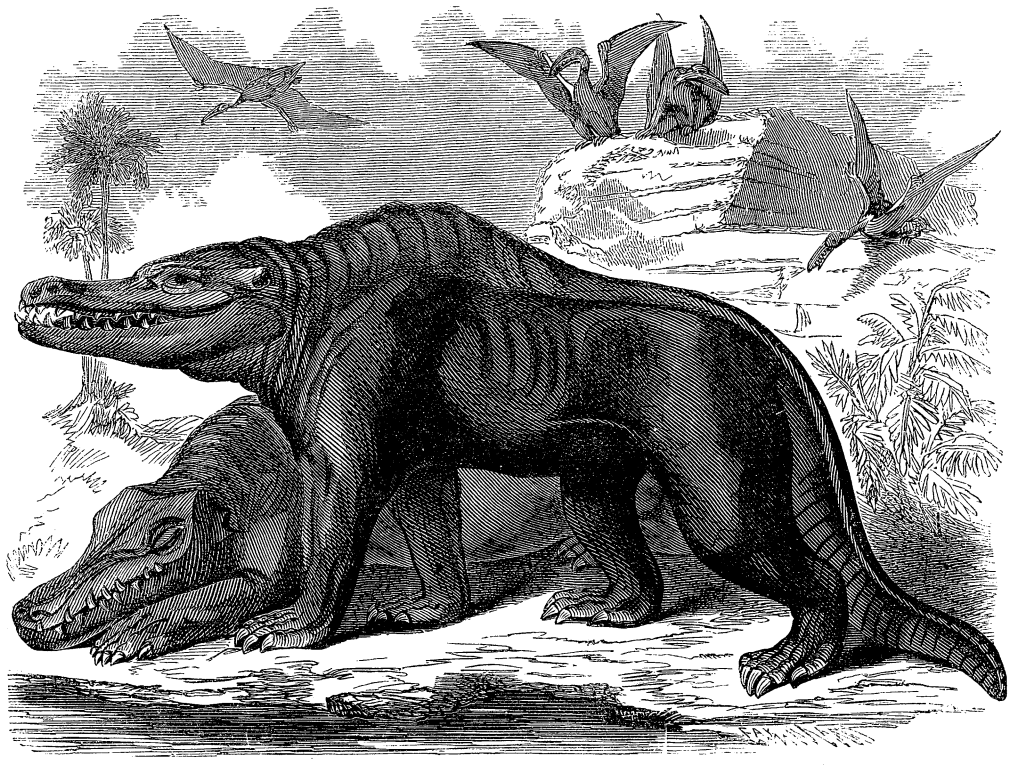
Other species are as follows: the RHINOCEROS CHAMELEON, *C. rhinoceratus*, found in Madagascar: the FLAP-NECKED CHAMELEON, *C. dilepis*, found in Senegal and the vicinity: the PEARLED CHAMELEON, *C. pumilus*, found at the Cape of Good Hope: the THREE-HORNED CHAMELEON, *C. Owenii*, found in Fernando Po. Most of the other species belong to Africa.

FOSSIL LIZARDS.—In former parts of this work we have mentioned some of the gigantic fossil lizards whose vestiges have been discovered by the geologists. Among these we have described the *Iguanodon* (page 8, vol. I.), supposed in its structure and habits to have borne some resemblance to the existing iguanas, which we have described. But a few more particulars may be proper in connection with the order to which this extraordinary animal belonged.

For our knowledge of this Monster of the Past, we are chiefly indebted to the energy, patience, and acuteness of Dr. Mantell, of London. Parts of several skeletons have been obtained, but none of them entire; one, however, is so far complete as to make it certain that this species was of the most gigantic dimensions, some supposing it to have been a hundred feet in length. In the latest edition of Dr. Mantell's "Wonders of Geology," he speaks on this subject as follows: "The length of the Iguanodon has been variously estimated, the difference in the computation depending chiefly on the extent assigned to the tail, which in the Iguana and many other lizards is much longer than the body. If the tail of the fossil reptile was slender, and of the same relative proportions as in the Iguana, the longest individual would be fifty or sixty feet long; but it is more probable, from the shortness of the bodies of the caudal vertebræ, that the tail was comparatively short and flattened at the sides, as in some living reptiles, for example, the *Doryphorus*. In that case the length of a full-grown Iguanodon would but little exceed thirty feet."*

* Mr. W. Hawkins has prepared restorations of many of the gigantic fossil animals, representing them as they are supposed to have appeared, and these are exhibited at the Crystal Palace, Sydenham, near London. In this he was assisted by Dr. Owen, who ranks as the first living Comparative Anatomist. Dr. Mantell regarded these restorations as executed with great skill and science, and worthy of every confidence. Several of them we have copied here and elsewhere in the present work.

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THE MEGALOSAURUS AND PTERODACTYLES.

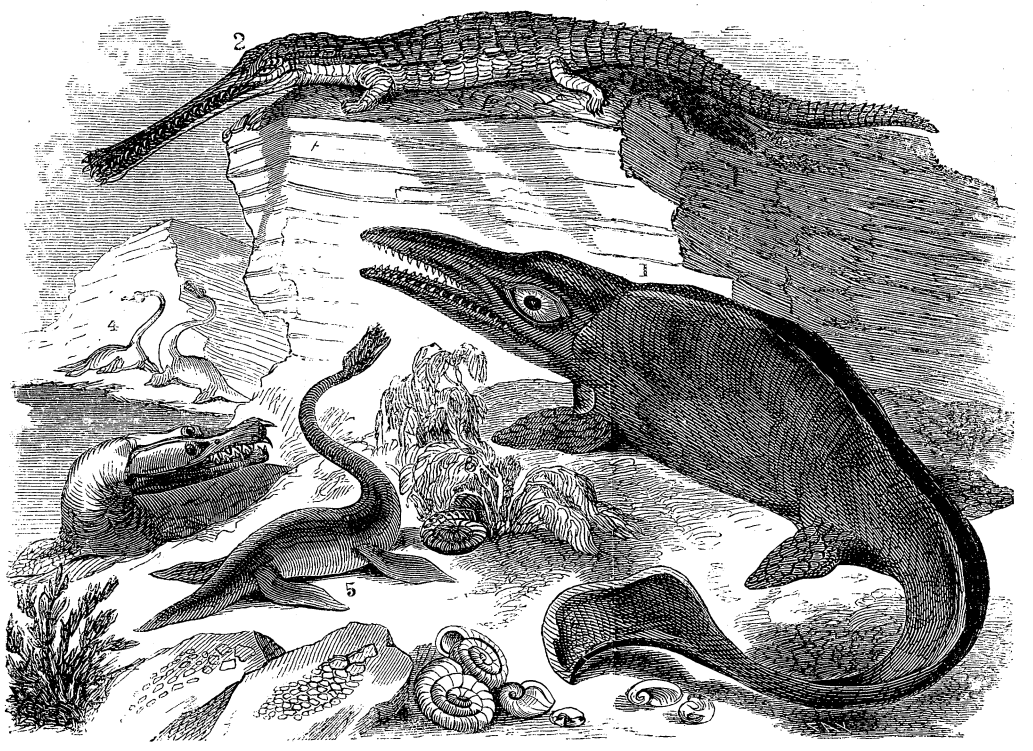
The *Hylæosaurus* was another enormous reptile, whose remains were found in the wealden* of Tilgate Forest. This animal appears to have combined some of the features both of the crocodile and of the lizard. It was covered with thick scales, and along the back was a row of long conical bones or spines, resembling the crests we have described as belonging to the Iguanas and Agamas. This animal is supposed to have been a terrestrial, herbivorous reptile, between twenty and thirty feet in length. Altogether it must have been of the most extraordinary reptilian organization.

The *Megalosaurus* was another gigantic lizard, whose remains have been found in the same localities as the preceding. From the teeth, of which numerous specimens have been discovered, and which had a conical, saber-like form, it is inferred that the animal was carnivorous. It was probably twenty-five to thirty feet long.

The *Plesiosaurus* we have already described (page 8, vol. I.); of the *Ichthyosaurus* there were many species. "These," says Mantell, "had the beak of a porpoise, the teeth of a crocodile, the head and sternum of a lizard, the paddles of a cetacea, and the vertebræ of a fish." Some of the species were of the size of young whales. The bones forming the sternum or chest resemble those of the ornithorhynchus; the paddles are four, and are like those of the turtles. In some species the bones of the fore-paddles are one hundred in number. The general form was like that of the grampus. The skin was destitute of scales. It was evidently carnivorous and aquatic.

* *Wealden* is a term used by English geologists in application to the uppermost series of the strata included in what is called the *Oolitic system*, that is, the rocks of the secondary formation, of which the Bath stone and Portland stone of England are examples. The term *wealden* was adopted from the fact that the formation was first observed in the *wealds*, that is, *woods*, of Sussex and Kent, in England. The Tilgate Forests are a part of this region. The whole consists of limestone, conglomerate, sandstone, and clay, abounding in the remains of fresh-water and land animals. These are supposed to have been deposited in an estuary or arm of the sea, which once covered this part of England.

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1. ICHTHYOSAURUS. 2. TELEOSAURUS. 3, 4, AND 5. PLESIOSAURUS.

The *Teleosaurus* appears to have been a gigantic land animal, resembling the gavials, but with more massive jaws and a stouter form. Its remains are numerous, especially in the wealden of Tilgate Forest; it therefore existed at a period when the fishes were abundant, but the mammals few in number. Its habits appear to have been more strictly marine than those of the gavials, and its powers of swimming and overtaking its prey were greater. It was covered over with imbricated scales, and was perhaps about fifteen feet in length. There were many species, one of which had a skull four and a half feet long, and one hundred and eighty teeth!

ORDER 4. **OPHIDIA.**

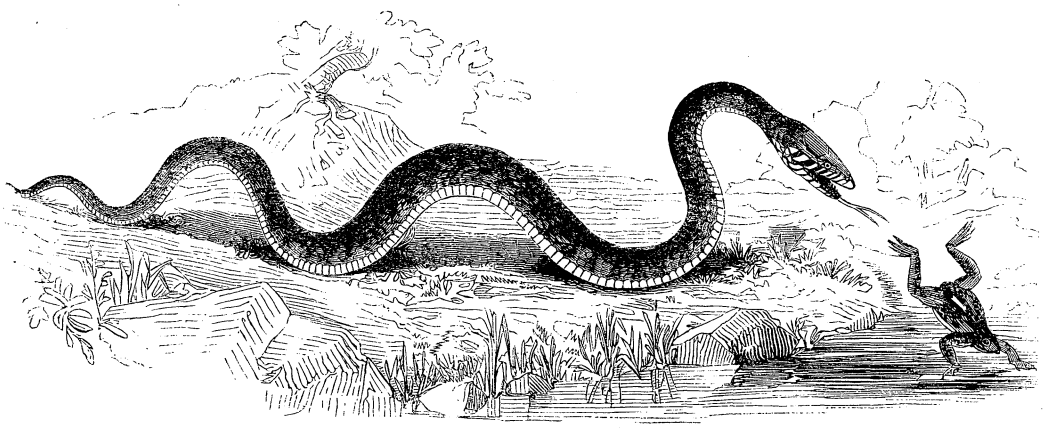
We now come to an order of reptiles which appear from the earliest ages to have excited a mingled fear and reverence in mankind. In some cases the serpent has been worshiped; in others it has been the symbol of eternity; everywhere it seems to inspire a species of horror in the beholder. In Genesis it is said that "the serpent was more subtle than all the beasts of the field," and therefore the Devil, in seeking to overturn the designs of the Almighty in the creation of man, took upon himself its image. The Brazen Serpent set up in the wilderness by Moses, being looked upon, cured the people which had been bitten by the "fiery serpents" as they journeyed in the wild and rocky regions of Mount Hor; this image is also deemed an emblematic foreshadowing of the Saviour. Serpent-worship appears to have existed alike among civilized and barbarous nations; among the ancient Egyptians it was the object of peculiar reverence, and with the Mexicans it was the very basis of their hideous and bloody religion. Strange ideas respecting this creature are even current in the proverbial language of our day: "wise as a serpent," and "a snake in the grass," though of somewhat contradictory significations, are still common expressions. When we come to consider these creatures, we shall not, perhaps, be surprised that they have ever made a strong impression upon mankind.

The great nursery of this reptile race is found in tropical regions. Tangled forests, impenetrable jungles, morasses teeming with luxuriant vegetation, and mouldering ruins overgrown with

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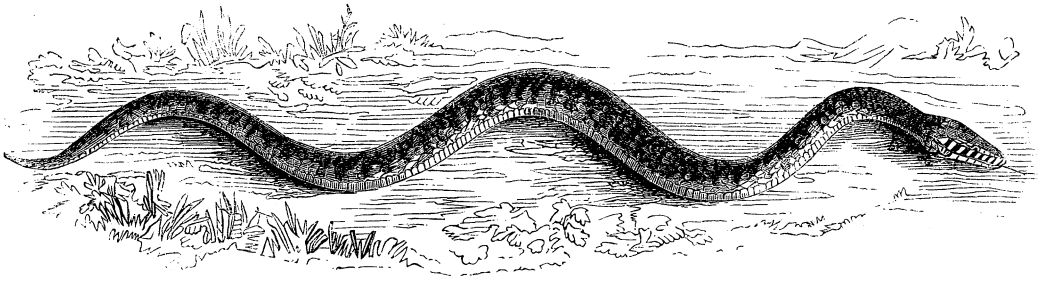
brushwood and creeping plants, are their favorite places of abode. There they not only exist, but swarm; there the most gigantic of their tribes rears its resplendent form; and there thousands of every size and hue astonish or alarm the passer-by. Some species, slender as whipcord, and of great length, twine around the twigs and boughs of trees and shrubs, their tints amalgamating with the color of the foliage that conceals them, while rapidly and silently they glide even to the tops of the loftiest trees, in chase of insects and of the eggs and young of birds. Others may be beheld by the traveler darting along the ground, crossing his path, and plunging into the midst of the jungle ere his eye can catch their tints, while a loud and angry hiss sufficiently intimates that it is perilous to follow. Many are endowed with the most deadly poisons, while others are of gigantic size and strength. In the Dutch colonies of the East Indies, André Cleyer is said to have purchased of the hunters of the country an enormous serpent, in the body of which he found a deer of middle age, absolutely entire. In another individual of the same species, also examined by this traveler, he found a wild goat, with its horns; and a third had evidently swallowed a porcupine with its quills. He also adds that a woman became the prey of a reptile of the same genus in the island of Amboyna, and that this kind is sometimes kept for the purpose of attacking buffaloes in the kindom of Arracan, on the frontiers of Bengal. We need hardly be astonished at this, when Prince Maurice, of Nassau Siegen, one of the governors of Brazil in the seventeenth century, assures us that he himself was an eye-witness of stags and other bulky animals, and even of a Dutch woman being devoured in this manner. Instances of this kind have, indeed, become common in more modern times.

The animals of this order, familiarly called *Serpents* and *Snakes*, are characterized by an elongated body, clothed in scales and destitute of limbs, but furnished with a tail. They have hooked, conical teeth, and cold blood like other reptiles; the skin is covered with scales and plates, and this is covered with an epidermis which is frequently cast. They possess the power of fasting a great length of time; they feed on living prey, and always swallow it whole, which they are enabled to accomplish by their faculty of dilating their jaws and bodies to an enormous size. This power is carried to such an extent that the largest species can swallow a bullock whole, though twice as thick as its body, and suffering no other inconvenience than that of lying in a state of torpor while digestion is proceeding. Serpents generally roll themselves up when in a state of repose, with the head in the center, and when disturbed, raise the head before they uncoil the body. They also frequently raise themselves upright, supporting themselves on the tail. They have great freedom of motion, the scales on the belly enabling them to lay hold of fixed objects, and by the alternate elongation of the body, they glide along, often with great celerity. Their usual



modes of progression are by a vertical motion, as represented in the preceding engraving, and more frequently by a lateral movement, which enables them to glide rapidly among grass and bushes, as exhibited in the following figure. They are not only able to run on the land, but they swim freely in water, and many species, as we have said, climb trees with facility. Few animals have such variety of

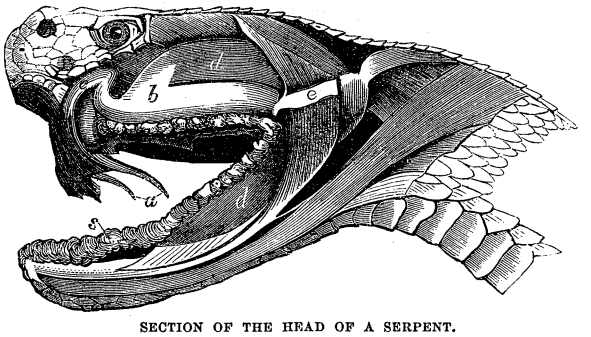
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locomotion: they can creep, glide, grasp, suspend themselves, erect themselves, leap, dart, bound, swim, and dive. They are mostly oviparous, their eggs being soft, of a yellowish-white color, covered with a leathery skin, and from twenty to thirty in number at each laying. Their senses are not very acute; the eyes are small, and without lids; the tongue is free, forked, and capable of considerable elongation and rapid motion. They are divided by Dr. Gray into two sub-orders, the VIPERINA, or *Venomous Serpents*, and the COLUBRINA, or *Colubrine Snakes*, which are for the most part harmless, though some of them are otherwise. These animals are exceedingly numerous, no less than one hundred and fifty species being in the Catalogue of the British Museum. We shall only attempt to describe a few of the most remarkable kinds.

THE VIPERINA.

The Viperina, so far as known, are all ovo-viviparous; they are also distinguished by the peculiar arrangement of the teeth in the upper jaw. The true maxillary bones are reduced to a very small size, capable of a great amount of motion, and bear a single pair of long curved fangs, which can be laid flat in the mouth during repose, or erected when in action by the agency of peculiar muscles. These are the only teeth supported by the maxillary bones; they are perforated throughout by a slender canal, which communicates with a large gland situated in the head, behind and under the eyes. This secretes the venomous fluid, which passes through a duct to the base of the tooth, and thence through the canal in its interior, until it is injected into the wound made by the bite of the serpent. Its propulsion is effected partly by the contraction of the proper walls of the gland, and partly by the pressure of the muscles of the jaws, which act upon it during their contraction. The poison which is thus injected into the wound mixes with the blood, and is then carried into the circulation, where it speedily produces an injurious effect, giving rise to an altered condition of the blood, which, if the poison be present in sufficient quantity, quickly renders it incapable of supporting life. In fact, a bite from one of the large poisonous snakes of tropical climates is generally fatal, even to man, if the animal be in a vigorous condition, and provided with a good supply of poison; but a bite from a similar snake, after it has nearly exhausted its venom by previous attacks, may give rise to little or no inconvenience. It is remarkable, also, that the effect of the poison of these creatures is very different upon different animals; the cold-blooded species in general appear to be almost indifferent to its effects, while most warm-blooded animals soon expire when a sufficient quantity is injected into their veins. Various means of preventing the injurious effects of the bite of these reptiles have been proposed, and the natives of most countries in which they abound have their favorite antidotes for the wounds inflicted by them. The only means, however, upon which it appears that much reliance can be placed, are



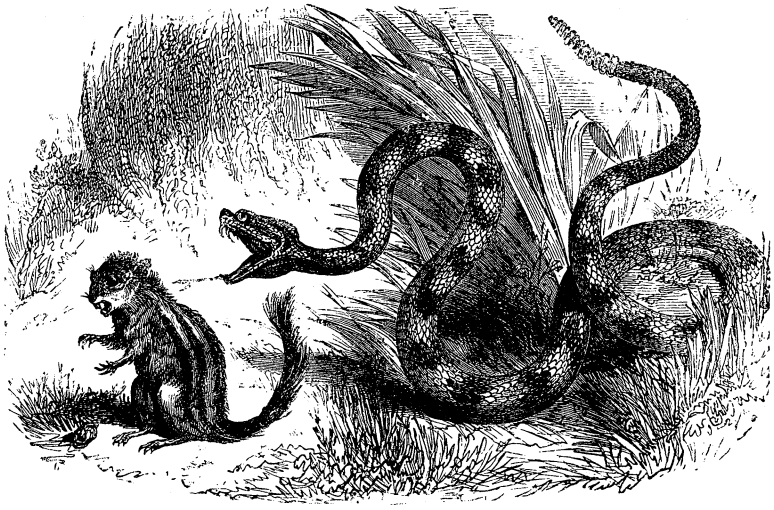
SECTION OF THE HEAD OF A SERPENT.

a, poison fangs; *b*, poison glands; *c*, conductor for the poison; *d d*, muscles of the jaws; *e*, tendon of the muscles; *s*, salivary glands.

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those directed to preventing the poison from getting into the circulation, and of these the principal consist in sucking the wound—either with a cupping-glass or with the mouth, which may be done without the least danger, the poison being quite innocuous when taken internally—cutting out the wounded part, or burning it with a hot iron or with caustic applications. All these remedies must, however, be adopted immediately after the wound has been received; if any time be allowed to elapse the most distressing symptoms make their appearance, and if these can be relieved by the administration of medicines, which, however, appears somewhat doubtful, the patient generally suffers for a long period from the effects of the bite.

The Viperina are divided into two families, the *Crotalidæ*, of which the rattlesnakes are the types, and the *Viperidæ*, of which the vipers are the types.

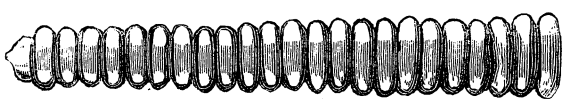


THE RATTLESNAKE.

THE CROTALIDÆ

This family not only contains the rattlesnakes, but a considerable number of other species distributed throughout the warm parts of the earth; they are all particularly distinguished by the presence of a deep pit on each side of the nose, situated beneath, and usually a little behind the nostril. This pit, the purpose of which is still unknown, is lined with small plates. The head is broad and flat, scaly on the crown, and furnished with small shields only on the sides and nose. The teeth are very small, but the poison-fangs are exceedingly large and powerful; and these snakes must be regarded as among the most dangerous of the order. The belly is covered with broad shields.

Genus CROTALUS: *Crotalus.*—This includes the *Rattlesnakes*, of which there are several species, all belonging to the continent of America. The Common or Northern Rattlesnake of the United States, often called *Banded Rattlesnake*, *C. durissus*, is of a yellowish or reddish brown, sometimes of a chestnut black, with irregular, rhomboidal, black blotches; head large, flattened, and triangular; neck small; tail short; length from three to four feet, sometimes even as much as seven or eight. Like the other *Viperina* they produce their young alive. Upon the tail is what is called a *rattle*, consisting of several horny enlargements loosely attached to each other, and making a loud rattling noise when shaken and rubbed against each other. These rattles generally increase with the age, but not regularly once a year, as is supposed. Two and even four have been known to come in a year, and sometimes several of the rattles drop off; they are seldom over twenty-five in number. The use of these extraordinary appendages seems



RATTLE OF TWENTY-FOUR JOINTS.

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to be to give warning of the presence of the animal, which is one of the most deadly of serpents. When suddenly disturbed, it usually throws itself into a coil and rapidly vibrates its rattles, which can be heard at the distance of a few yards; it then springs, sometimes four or five feet, fixing its fangs in its victim. The bite is usually fatal to man, if preventive means are not immediately applied. It is not of a vicious disposition, never going out of its way to inflict its deadly bite, and only making an attack when intruded upon. Sometimes, though rarely, this is done without its warning rattle. It is said that hogs defy this reptile, and feed and fatten upon it; this is improbable. Dr. De Kay states instances in which swine have been killed by the bite of rattlesnakes. It was formerly supposed that this, as well as some other serpents, had the power of fascination; this is now discredited. It appears that birds, seeing a serpent near their nest, often flutter around the intruder, and sometimes coming too near, are suddenly snapped up by their enemy. Cats often catch birds that flutter around them merely from agitation, and these animals have hence been supposed to possess powers of fascination.

The Common Rattlesnake is found throughout the United States, generally in rocky and hilly, or mountainous regions. It feeds on birds, rabbits, squirrels, rats, &c. In the autumn it retires to some deep crevice among the rocks, or hole underground, and lies in a torpid state till spring. Often great numbers are found lying twined together in heaps; sometimes striped snakes are mingled with them. In the settled parts of the country they are now rare; but in some wild regions, even at the North, they are common. Dr. De Kay tells us that a few years since, one thousand one hundred and four were killed in three days by two men on the east side of Tongue Mountain, in Warren County, New York. They were killed for their oil, which is deemed a cure for certain diseases. Lawson says, "they cast their skins every year, and commonly abide near the place where their lost skin lies. These cast skins are used in medicine, and the rattles are esteemed good to expedite the birth. The gall is made up into pills with clay for use, being given in pestilential fevers and the small-pox." It is hardly necessary to say that these idle notions have passed away.

Other species found in the United States are the WATER RATTLESNAKE, *C. adamanteus*, six to eight feet long, found in the Carolinas and Florida; the OREGON RATTLESNAKE, *C. Oregonus*, found in the country west of the Rocky Mountains, and along the Oregon and Columbia Rivers. The *C. horridus* is a South American species of great size and virulence.

Genus CROTALOPHORUS: *Crotalophorus.*—This includes several species of inferior size, as the SMALL RATTLESNAKE, *C. miliarius*, common in the Southern and Western States; the *C. tergeminus*, found in the Rocky Mountains, and the *C. Kirtlandi*, found in Ohio and Michigan.

Genus TRIGONOCEPHALUS: *Trigonocephalus.*—This includes several species which are very venomous, but without rattles. The COPPER-HEAD, *T. contortrix*, is thirty to forty inches long; copper-colored with reddish-brown blotches on the back; the head large, and very distinct from the neck; the mouth large, and the fangs large and yellowish-white. It is a vicious reptile of sluggish habits; when approached, it raises its head and darts out its tongue. Its bite is dangerous, often fatal. It feeds on field-mice, frogs, and young birds; its haunts are in low meadows, and moist pastures. It goes under the popular names of *Chunk-Head*, *Red Adder*, *Copper-Belly*, *Red Viper*, *Deaf Adder*, and *Dumb Rattlesnake*. It is found in some of the Eastern and in the Middle, Southern and Western States. It seems to be nowhere abundant.

The WATER VIPER, or WATER MOCCASIN, *T. piscivorus*, is twenty to twenty-four inches long, of a dark-brown color above and leaden-gray beneath; length about two feet; inhabits damp or swampy places; sometimes is found in water, from which it is never far removed. It feeds chiefly on fish. In summer, numbers of them are seen hanging from low branches of trees over lakes and rivers. It attacks every thing that comes within its reach, and is especially dreaded by the negroes on the rice plantations. It is found in the Southern States and also in Tennessee, where it is called *Cotton-mouth*. The *T. atrofuscus* is two feet long, resembles the copper-head, and is found in Tennessee.

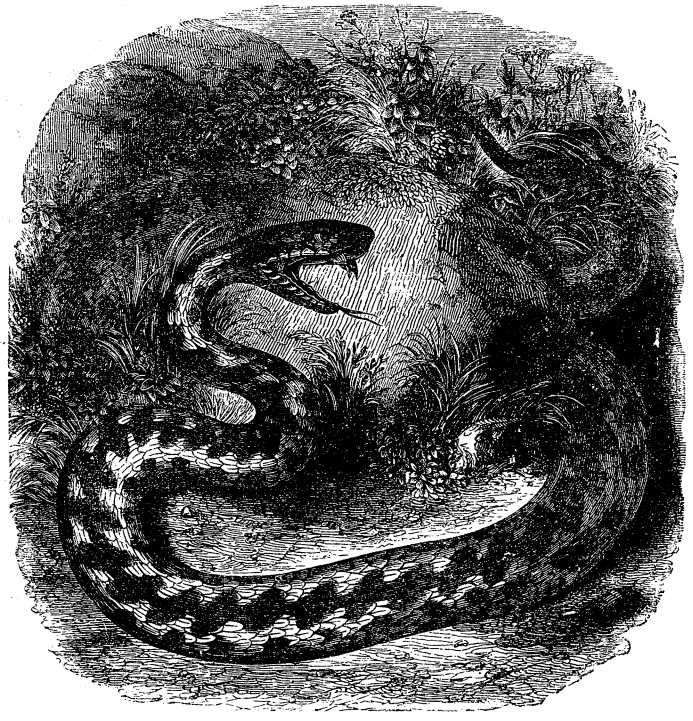
Genus CRASPEDOCEPHALUS: *Craspedocephalus.*—This includes several South American species. The *C. lanceolatus*, is five or six feet long, and is much dreaded in the West Indies. It frequents the corn-fields, living principally on the rats that abound in them.

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Genus ELAPS: *Elaps.*—This includes the BEAD SNAKE, *E. fulvius* of Linnæus; the form is long and slender; length two feet; color red, surrounded with black rings banded with yellow; it has erect poison fangs, but is mild and gentle, and is never known to bite. It is often dug up from the ground in the fields of sweet potatoes in the Carolinas.

There are several species of *Elaps* in South America which are venomous, and when their haunts are invaded advance fiercely upon the intruder. The *E. lubricus*, when disturbed, rises upon its tail, its head and body almost perpendicular, and with a most malignant expression threatens vengeance upon the offender.

There are several genera of poisonous serpents in Asia belonging to this family, as *Trimesurus*, *Parias*, *Megæra*, and *Atropos*.



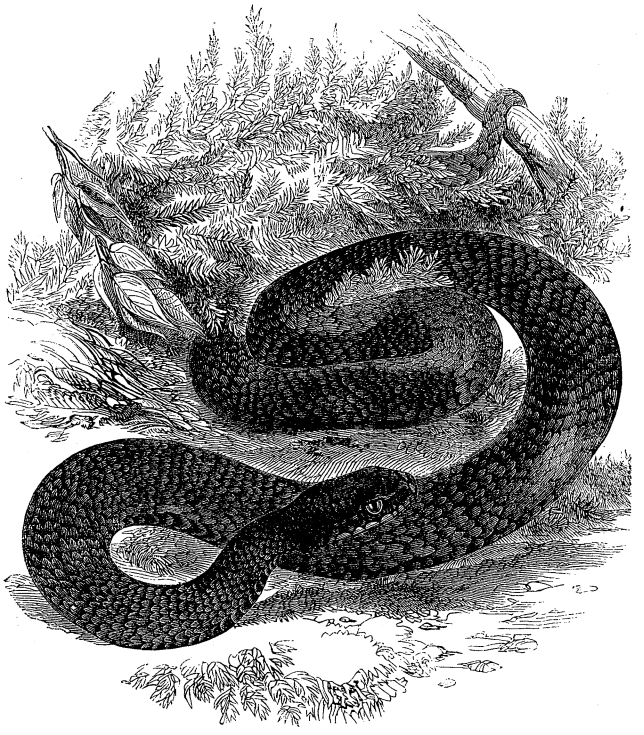
THE COMMON EUROPEAN VIPER.

THE VIPERIDÆ.

This sub-order includes the Vipers of the Old World, distinguished from the Crotalidæ by the absence of the pits in the side of the face.

Genus PELIAS: *Pelias.*—The COMMON EUROPEAN VIPER, *P. Berus*, in color is yellowish-brown, with a line of rhomboidal figures running along the back, and a row of spots on each side; length about two feet; it inhabits woods, and dry and stony districts, and feeds on small quadrupeds and reptiles. Its bite is poisonous, though seldom fatal. It appears to be well attested that the female of this species allows her young ones, when suddenly alarmed, to take refuge in her body, by entering at her mouth. In many cases, when the mother has been killed, the young which have thus retreated to her stomach, have been found, and on being liberated immediately resumed their natural activity. The eggs of this species are covered with a thin skin, which is broken in the act of parturition, and the young viper at once assumes all the virulence of the race. Bell tells us that if a female viper, about to bring forth, be killed, and the young ones coiled up in the eggs, appearing almost like a solid mass, be set at liberty by opening the abdomen, they will immediately crawl about, and being irritated, will throw themselves into an attitude of defense.

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THE BLACK VIPER.

This species is subject to great diversities of color: the *Red Viper* and *Black Viper* are recognized as common varieties. In the autumn, these reptiles seek a secret and secure place, where they remain torpid during the winter, several of them being usually entwined together. They are found in Europe from Sweden to the Mediterranean Sea, and are the only venomous reptiles of Great Britain. The disposition of mankind to attribute almost supernatural powers to serpents is manifested in the history of this species. Viper broth was anciently considered to possess invigorating qualities: both Pliny and Galen speak of the efficiency of viper flesh in curing ulcers, elephantiasis, and the diseases arising from a corrupt state of the system. It was generally served to the patient boiled like fish, though sometimes it was dried and given in the form of a powder. Sir Kenelm Digby's beautiful wife was fed on capons fattened with the flesh of vipers.

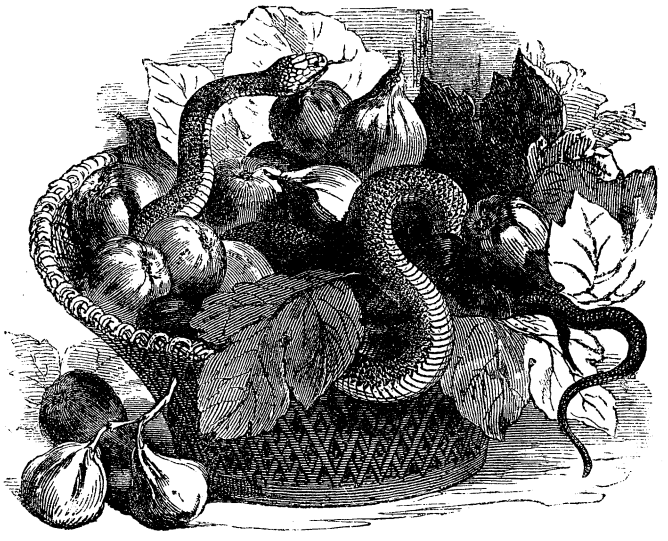
Genus CLOTHO: *Clotho.*—This includes the PUFF ADDER, *C. arietans;* it is short and thick, with a malignant aspect and most deadly venom; found in Southern Africa. A man has been known to die of the bite of this serpent in an hour and a horse in two hours.

Genus ACANTHOPHIS: *Acanthophis.*—This includes the DEATH ADDER, *A. tortor*—a species very much diffused in Australia, and greatly dreaded by the inhabitants on account of the mortal wounds it inflicts. Death is sometimes said to ensue from its bite in less than a quarter of an hour.

Genus CERASTES: *Cerastes.*—The CERASTES or HORNED VIPER, *C. Hasselquistii,* among the numerous species of viper, is one of the most noted. It is eighteen to thirty inches long, and has a small, horn-like process over each eye, which is directed forward when the animal is excited. It is very active, and springs two or three feet upon its victim, inflicting a deadly wound. It is found in the dry and sandy deserts of Egypt, Syria, and Arabia. Some naturalists regard this as the *Asp* which Cleopatra employed to cause her death, in order to avoid being taken to Rome by her conqueror, Octavius, and forming part of the retinue in his triumph. There are several other species in Africa resembling the Cerastes.

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Genus VIPER: *Vipera.*—This includes the Asp, *V. aspis*, a small species of venomous serpent found in the European Alps.



THE ASP.

THE HOODED SNAKES.

The *Hooded Snakes*, of which there are several species, are arranged with the *Colubrina* by some naturalists, but as their venom is of the most deadly nature, we shall follow Cuvier and place them with the *Viperina*. In these the skin about the neck is loose, and the ribs of that part of the body are capable of being extended and raised, so as to dilate the skin into a sort of disk, which, from its resemblance to a *hood*, has given them their popular name.

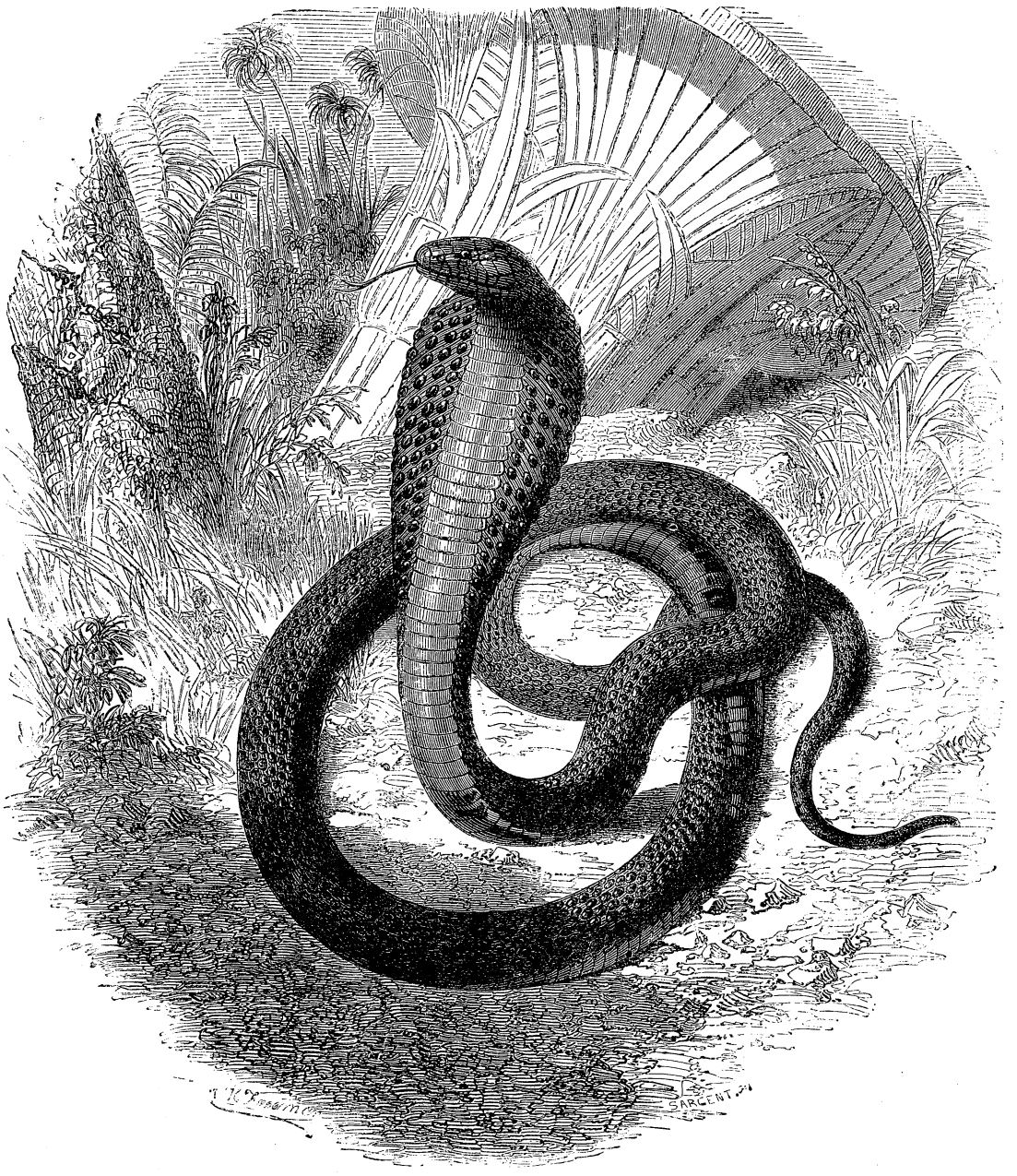
Genus NAIA: *Naia.*—This includes the Naia Haje of Africa, probably the *Asp* or *Aspic* of Cleopatra; its color is blackish-brown, with a shining, slaty hue around the head. Its bite is very deadly, and poison is distilled from its fangs when it is irritated. One species, the *Spitting-Snake*, has the power of ejecting its venom to the distance of a few feet. The jugglers of Grand Cairo have the art of taming the Haje, and teaching it to dance for the amusement of the people, first, no doubt, depriving it of its fangs. The habit this serpent has of erecting itself when approached, led the ancient Egyptians to regard it as the guardian of the places it inhabited. Hence they made it the emblem of the divinity which they supposed to protect the world, and accordingly sculptured it in their temples, on each side of a globe. It is a curious fact that the jugglers of Egypt, at the present day, are accustomed to throw this serpent into a state of catalepsy by pressing the nape with the fingers. In this case it becomes stiff and immovable, like a rod. Probably the magicians of Egypt, in the contest with Moses before Pharaoh, according to Exodus vii. 9–12, only performed this trick.

Other African species of Naia are the *N. Hamachates* and *N. rhombeata*, both resembling the preceding, and found at the Cape of Good Hope.

The Cobra di Capello, that is *Adder of the Hood*, is a name given by the Portuguese to a species common in India and Ceylon, *N. tripudians*. It resembles the Haje, but is found from five to ten feet long. It is marked on the back of the neck with a figure resembling a pair of spectacles, whence it is called the *Spectacle-Snake*, and *Serpent à lunettes* by the French. It is an active and deadly species, but the jugglers of India teach it to dance and keep time to music; they also handle it, probably having first extracted its fangs. The Hindoos have many superstitions respecting this serpent, and even believe that the Deity sometimes assumes its form. In some of the temples it is an object of worship, being carefully fed with milk and sugar by the priests. When thus treated it becomes quite tame. It seems to have a love of music, and will often come out of its hole to listen to a tune on the pipe or flageolet, played by the snake-charmers. These persons are often employed by the people of India to rid their houses of these serpents, which is done by enticing them out of their holes by their music, and killing them as soon as they appear. In a wild state, this species is an object of general dread. The mungoos, or moongus, a species of ichneumon, is its deadly enemy, and often destroys it. The following account, recently furnished by a British officer in Hindostan, gives a thrilling picture of an incident of this nature:

"A short time anterior to the recent mutiny in India, I commanded a little detachment of

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THE NAIA HAJE.

native infantry at Condapilly, in the Northern Cicars. From having once been a town of considerable importance, it has dwindled to a very inferior rank, and the hill-fort, at one period of considerable strength, now presents nothing but a meager skeleton of its past celebrity. Towering high above the little esplanade on which the humble range of barracks which sheltered the detachment was raised, the mountain was accessible at only one point, where a winding track—the remains of a flight of stone steps now in complete dilapidation—formed a steep ladder, up which I have often toiled at early dawn, eager to watch the rising sun from the topmost pinnacle—a sight that amply repaid me for the fatigue of half an hour's climbing. There, crumb-

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ling piecemeal beneath the foot of time, lay mouldering an ancient building of Moorish architecture, still suggesting, by its extensive ruins and palatial structure, recollections of the Mahomctan prowess which, so far back as 1741, had wrested the province of Condapilly from the hands of the Hindoos.

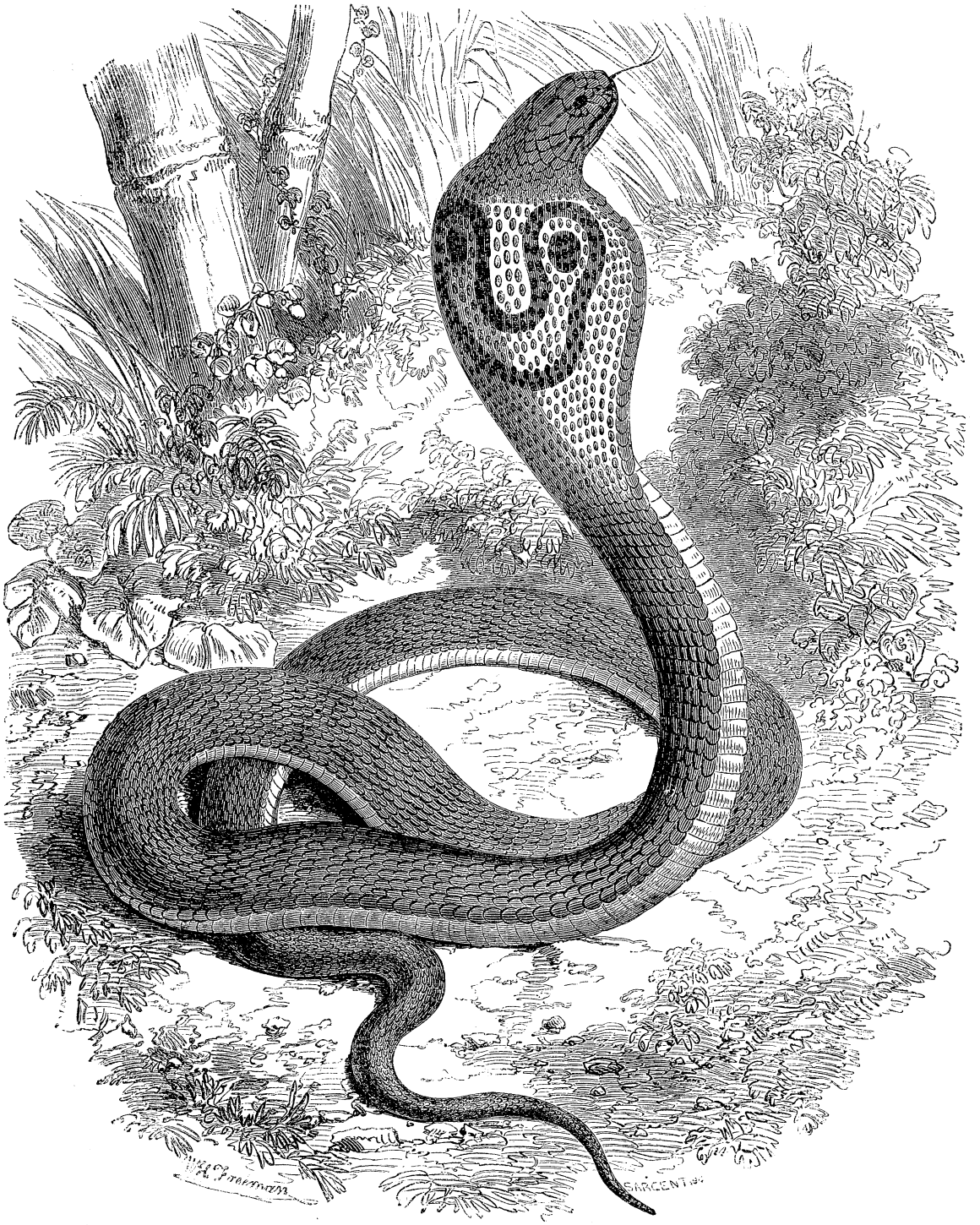
"A long but sleepless night in sultry March had fevered my blood, as one morning, ere yet a single individual was stirring about our quarters, I strolled toward the mountain gorge, and had stumbled almost to the top of the steep acclivity before the faint flush of dawn had roused the sentinel, whose call awoke the solitary pair of musicians of our party, a drummer and fifer, to sound the *réveillé*. In ten minutes more I stood panting on the summit of the rock, gazing thirstily on the scene beneath me, where Asiatic beauty winded slowly before me, like a glorious river, whose changeable waters the eye tired not of drinking. I had no fear of thief or Thug, for a late excursion in the district behind me had assured me of safety; but nevertheless I started violently when, from the branches of a stately peepul tree that grew close by, a dark figure, that seemed of human proportions, leaped with a jibbering cry upon the ground.

"I had no great reason to be alarmed, for I saw not a man, but a monkey—one of those long-legged, brown monkeys, with white-streaked faces, that abound among these heights, and which, probably little less startled than myself, receded as I advanced, jibbering its dissatisfaction at my intrusion. At the foot of the peepul tree, throwing up its rich white petals, that shed around a sweet but sickening odor, grew a magnificent plant of the datura; and as I stooped to pluck it, a rustle in the underwood beyond, followed by an acute, sharp scream, which I ascribed to my friend the monkey, arrested my hand. I had judged correctly; but I had underrated the number of my early companions. With a spring that brought it almost to my feet, making me in my turn retreat, the monkey lay moaning, and, as I thought, violently convulsed among the grass; nor did I at the moment perceive, what indeed I discovered with a degree of horror, that around its body was twisted a gorgeously-spotted snake—the cobra di capello! I wish I could describe the maddened contortions of the monkey, as, writhing beneath the straining coils of the reptile, it rolled on the grass in vain efforts to rid itself of its deadly assailant. The piteous gaze of its eyes, as they wistfully looked up into my face, was eloquent with a summons for help which I was by no means inclined to resist. Whether the snake had bitten it or not I could not guess, for it seemed to me as if it were merely playing with the animal—that fatal game which the cat plays with the mouse! But I shouted, and threw a stone, and then seizing a withered branch that lay on the ground, I advanced to the charge. The monkey, which at another time would have fled at my approach, now remained perfectly motionless, as if it awaited certain succor. But the serpent, aroused to the cognizance of an assailant by a smart blow on the head, instantly inflating its horrid crest into that hood-like form which renders it so appallingly hideous, gave vent to a loud hiss that seemed brimful of passion.

"Again and again I struck at it; nor was it without a cold thrill through my veins that I saw it disengage itself from the monkey; but far from attempting to make its escape, as I conjectured it would do, it turned itself, half erect, toward me, and with a fluttering hobble—like the hop of a bird whose wings have been broken—it leaped, with forked tongue protruded, right in my very path! There was no time for thought! My stick was neither strong nor long. I could see the venomous eyes burn like fire, and the colors of its swelling neck glow more deeply, as it prepared to spring again; and I was fairly on the point of making my retreat, by plunging, at all hazards, down the rock behind me, when a shrill, chirruping cry, somewhat like that of a guinea-pig, was heard, and suddenly an elegant little creature, which at the moment I was well nigh ready to spiritualize into a good genius, sprang upon the serpent with a bound of lightsome ferocity, which reminded me of the swoop of a kite upon a water-rat.

"It was a mungoos! And now, indeed, a combat took place which fixed me to the spot with mute admiration; but not very long. Once or twice it seemed to me that the mungoos was bitten, but it might not have been so, for the velocity of their movements, as, clinging together, the snake and its foe rolled over and over among the long grass, prevented minute observation. It is asserted that, when bitten by a snake, the ichneumon retires for a moment to eat of some unknown plant, capable of rendering null the viperine venom; but on this occasion nothing

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THE HOODED SERPENT.

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of the sort occurred. The mungoos left not the conflict for a breathing-space; and at the end of about ten minutes, the cobra di capello lay dead, torn and mangled piecemeal by the little animal, which frisked and danced about, with a purring sound, in a perfect frenzy of enjoyment.

"As I held out my hand, actually believing, in the enthusiasm of the moment, that it would approach to receive my caresses, the mungoos, giving a bright, quick look at me, stamped its tiny feet briskly on the relics of the serpent, as if in scorn of its victim, and disappeared among the brushwood. I had forgotten the poor monkey. I found it stretched out, stiff and stark, among the datura flowers. The mungoos had come too late!"

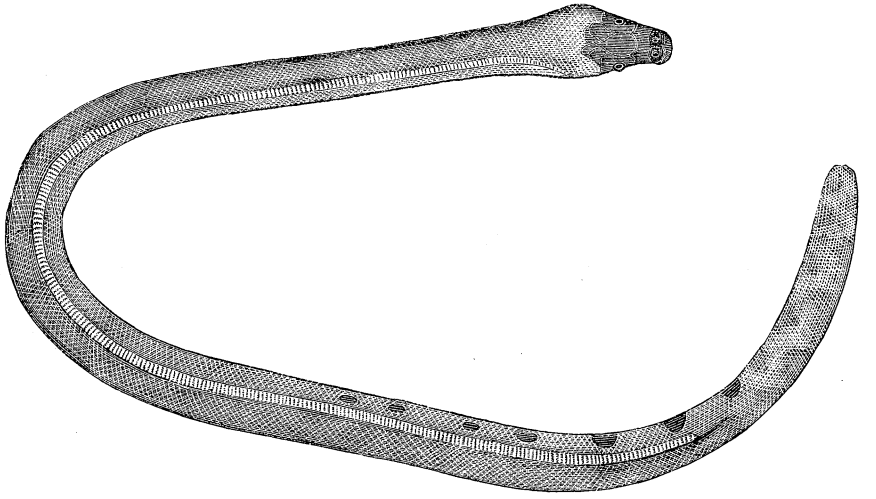
There appear to be several other species of this venomous genus in India and the contiguous islands, as the *N. Bungarus* of Java and Sumatra; the *N. Bungaroides*, a somewhat smaller species, found in the same countries; the *N. porphyrica* and *N. curta*, natives of Australia, &c.

Genus HAMADRYAS: *Hamadryas.*—To this belong several species of hooded serpents, resembling the cobra di capello, one of which is the SUNKR CHOAR or *Great Hooded Tree-Snake* of India, *H. ophiophagus;* their poison is, however, less active, though generally fatal. They are said to feed on other serpents; it is probable that the accounts given of very large cobras, measuring from ten to fifteen feet, refer to species of hamadryas.

There are several other genera of Viperidæ, according to Dr. Gray, as *Daboia*, *Echis*, and *Sepedon*. Some belong to Asia, but the greater part to Africa.

THE COLUBRINA.

Nature seems to have delighted in the form of the serpent, for it is not only multiplied exceedingly throughout the warm parts of the earth, but these animals are greatly diversified in their endowments. Some are of enormous size and power, others are not larger than a withe; the most vivid colors, green, red, and yellow, are bestowed on some, while others are of somber black or brown; many have poisonous fangs, and inflict death by their bite; others, and much the larger number, are harmless. The *Colubrina*, especially, are numerous, and, comprising serpents of very different attributes, have been very differently arranged by naturalists. Not attempting to follow any of these systems, we shall only present brief descriptions of some of the most interesting groups belonging to this division.



THE BICOLORED SEA-SNAKE.

THE HYDRIDÆ, OR SEA-SNAKES.

These are confined to the seas of Asia, and the Asiatic and Polynesian Islands, seldom even ascending the mouths of rivers. It is said, indeed, that they cannot live in fresh water, but this is probably a mistake, as they are air-breathing animals, and visit the shore, where, in fact, they deposit their eggs. They are often seen at sea asleep, and are then easily captured. They

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are exceedingly venomous, and are much dreaded by the fishermen, in whose nets they are not unfrequently caught. They rarely exceed four feet in length.

Genus PELAMIS: *Pelamis.*—This includes the BICOLORED SEA-SNAKE, *P. bicolor*, found along the islands of the Pacific Ocean, especially in the vicinity of Tahiti, where its flesh is eaten by the natives. Another species, the *P. ornata*, is found in the region of Borneo.

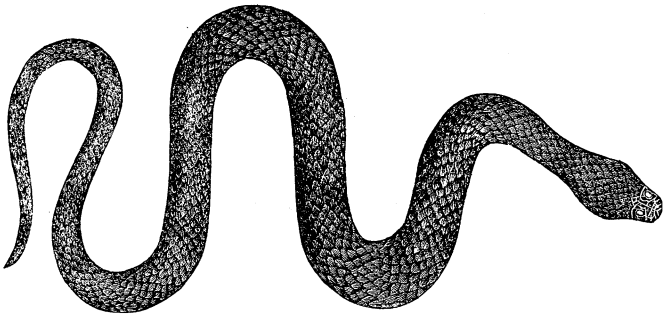
The BANDED SEA-SNAKE, *Chersydrus granulatus*, inhabits the bottoms of saline creeks and ditches in Java; it is exceedingly venomous.

There are several other genera, according to Dr. Gray, as the *Lapemis*, *Aturia*, *Microcephalophis*, *Enhydrina*, *Hydrophis*, *Chitulia*, *Kerilia*, &c., found along the coasts of Asia, and of the Asiatic Islands.

THE FRESH-WATER SNAKES.

These are more numerous than the preceding group, the species being distributed over all the tropical regions of the earth; they are especially abundant in India, China, the Asiatic Isles, the West Indies, and South America. Several species are common in the United States.

Genus CERBERUS: *Cerberus.*—This includes the KAROO BOKADAM of India, *C. cinereus*; it is three and a half to four feet long, its body covered with imbricated scales; color dark gray above; dark yellow beneath. It has no poisonous organs; found in India. There are other species of Bokadam in Borneo, the Philippine Isles, and Australia.



THE KAROO BOKADAM.

Genus TROPIDONOTUS: *Tropidonotus.*—The animals of this genus possess the power of elevating the ribs, and thus flatten the body; they are consequently able to swim well; some, in fact, live mostly in the water; others, though living on the land, are more or less aquatic. The species best known in this country is the COMMON WATER-SNAKE, *T. sipedon*, from two and a half to four feet long; body robust, color variable, but usually dark brown above, sides mahogany color, beneath white, varied with reddish. It generally lives in water, and is often seen along the borders of rivers and lakes, sometimes coiled upon a stick on the margin. It is of a sullen, threatening aspect, but is entirely harmless. It feeds on frogs and fishes, and is often called the *Water-Adder*. It is found in the Middle and Eastern States and in Ohio; probably its range is still more extensive.

The *Tropidonotus fasciatus* resembles the preceding; it lives most of its time in the water, or about the banks of ponds and rivers, feeding upon frogs and other small reptiles. It swims with great rapidity, and hundreds of them may be seen darting through the water in all directions, constantly protruding their tongues as if to feel the objects before them. It is a bold species, and is often seen in summer on the lower branches of trees overhanging the water; found in the Southern States.

The COPPER-BELLY, *T. erythrogaster*, is four feet long, brownish red above, and bright copper color below; habits like the preceding; found in the Carolinas.

The *T. taxispilotus* is a large water-snake, found in South Carolina and Georgia. The *T. niger* is a rare species, found in New England. The *T. rigidus* is found from Pennsylvania to Mississippi.

The COMMON STRIPED-SNAKE, *T. sirtalis* of Holbrook, *T. tænia* of De Kay, is two to four feet long, color greenish-brown, with three light-colored stripes along the body, the colors varying in shade; the tail is short and rapidly slopes to a point. It is one of our most common species, and is found from Canada to the Southern States; vast numbers are devoured by hawks and owls. It is abundant in Ohio, where it is eaten by hogs, and also, it is said, by fowls, ducks, and turkeys. It feeds on frogs, toads, and the smaller quadrupeds; it is timid, and seeks retreat

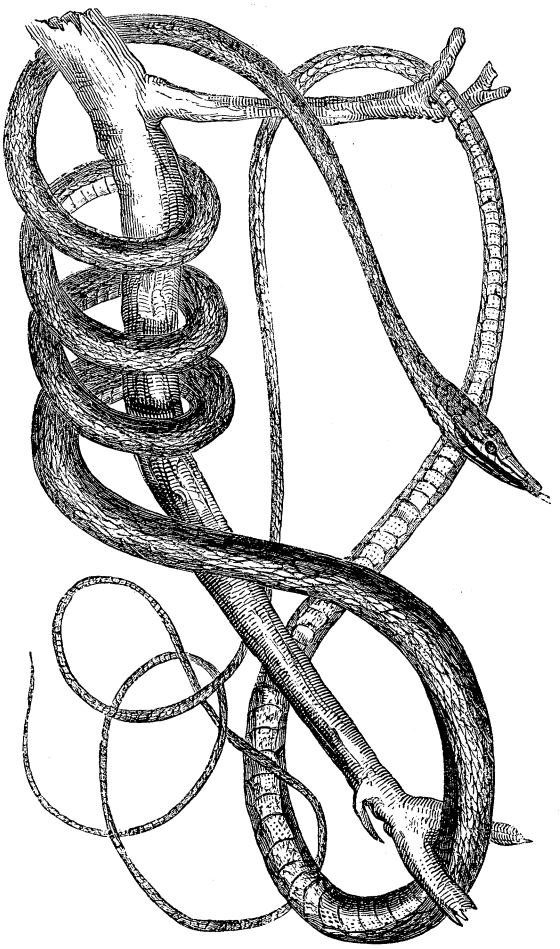
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from man; when irritated, it brandishes its tongue in a threatening manner. It is not venomous, but if taken in the hand it will sometimes bite, inflicting a troublesome though not dangerous wound. It takes to the water readily in pursuit of its prey, and chiefly affects low marshy places, though it is sometimes found in elevated districts. It is often met with in great numbers, and sometimes in company with rattlesnakes under peat moss, at a sufficient depth to protect it from the frost. It passes under the various names of *Green Garter-Snake*, *Stone Garter*, *Swamp Garter*, *Water Garter*, and *Striped Adder*.

There are some other species of this genus in the United States, as the YELLOW-BELLIED SNAKE, *T. leberis*, two to three feet long; found in the Middle States; and the SMALL BROWN SNAKE, *T. De Kayi*, about fifteen inches long, of a reddish-brown color, and living in or near water; found in Massachusetts and Louisiana.

THE TREE-SNAKES.

There are many serpents of very slender form, which, while living more or less on the land, frequently ascend trees, especially in pursuit of their prey. They are generally nimble, harmless, and beautiful species.

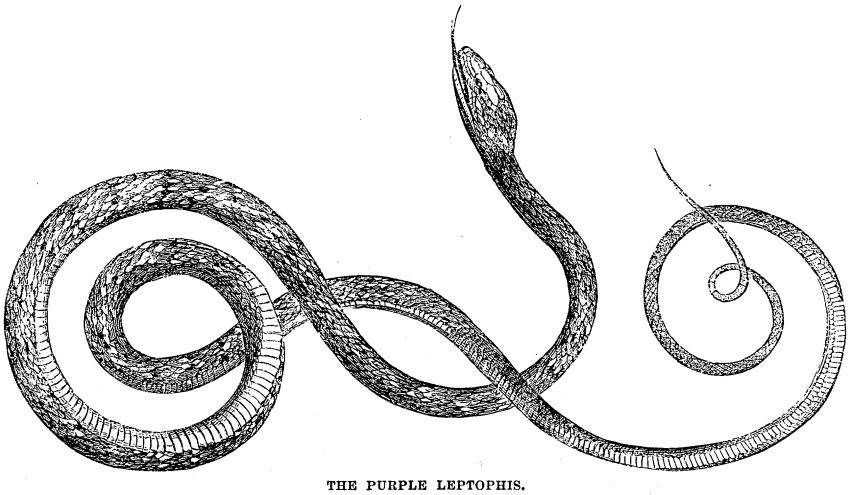


THE GOLDEN TREE SNAKE.

"The whole of the serpents composing these genera live," says Mr. Bell, "in woods, entwining themselves among the branches of trees, and gliding with great rapidity and elegance from one to another. These habits, combined with the graceful slenderness of their form, the beautiful metallic reflection from the surface in some species, and the bright and changeable hues in others, place them among the most interesting of the serpent tribe. Their food consists of large insects, young birds, and so forth, which the extraordinary size of the head, the width of the gape, and the great dilatability of the neck and body, enable them to swallow, notwithstanding the small size of these parts in a state of rest. In a specimen in my possession, the length of which is four feet nine inches, the diameter of the neck is hardly two lines. When the skin is distended either by food or during inspiration, the scales are separated from each other, and the skin, which is of a different color, becomes visible in the interstices, producing a curious reticulated appearance. Notwithstanding the poisonous mark was affixed by Linnæus to the only species of *Dryinus* known to him, *Coluber mycterizans*, it is well ascertained that they are all of them perfectly harmless; and it is asserted of that species that the children are in the habit of taming and playing with them, twining them round their necks and arms, and that the snakes appear pleased at being thus caressed."

Genus DRYINUS; *Dryinus*.—To this belongs the GOLDEN TREE SNAKE, *D. auratus*, four to five feet long; color yellowish-gray, gleaming with a pale golden hue, and dotted with whitish and black; native of Mexico. There are several other American species.

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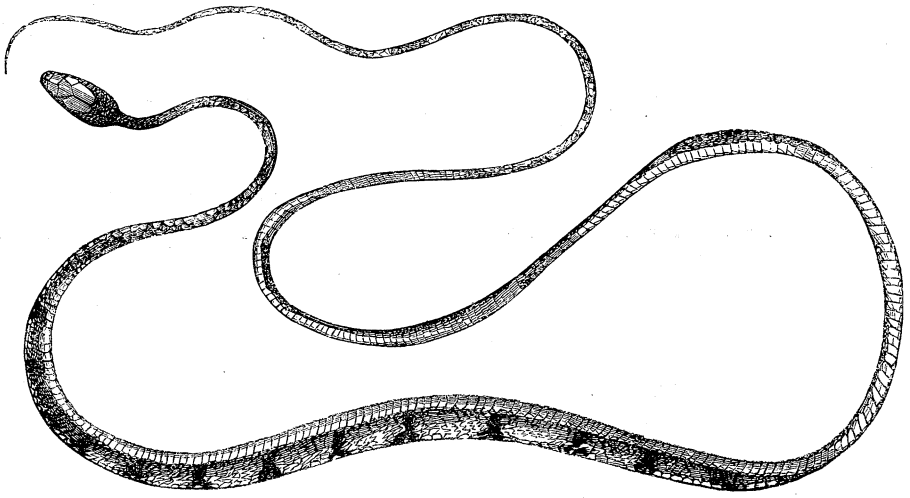
THE PURPLE LEPTOPHIS.

Genus LEPTOPHIS: *Leptophis.*—Of this there are several species, noted for a slender body and a long, slender tail. The RIBBON-SNAKE, *L. saurita*, is two feet long; color brown; body marked with three yellowish stripes. It is exceedingly nimble, climbs trees, feeds on toads, frogs, and insects, and is found in the New England, Middle, and Western States. There are several varieties.

The GREEN SNAKE, *L. æstivus*, three feet long; bright golden-green above, and yellowish-white beneath; it is easily tamed, so as to eat from the hand; found in some of the Middle and Southern States.

The PURPLE LEPTOPHIS, *L. purpurascens*, is of a violet color, passing into green, with a golden luster. Found in India. One or two similar species are met with in Australia.

Genus DIPSAS: *Dipsas.*—This includes several species, also noted for the slenderness of their



THE DIPSAS CYANODON.

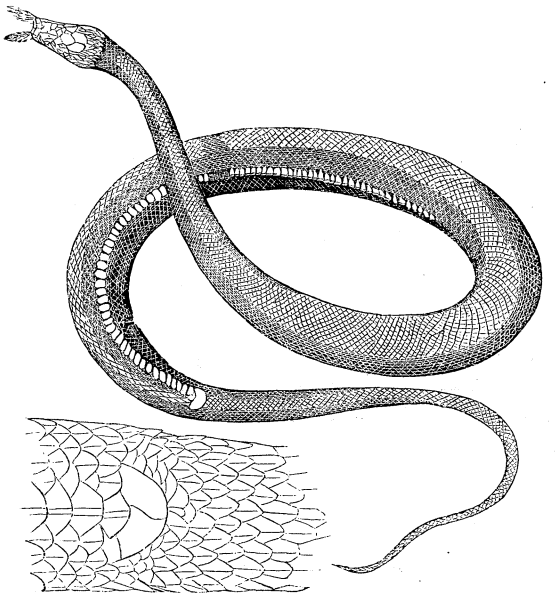
form; the head, however, is very large in proportion to the body. The *Dipsas cyanodon*, which may serve as an example of the genus, is harmless, arboreal in its habits, and found in India.

Genus DENDROPHIS: *Dendrophis.*—This includes the *D. ahætulla*, four to five feet

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long, with an elongated snout, and a head much larger than the body; found both in India and Africa.

Genus HERPETON: *Herpeton.*—This includes a very curious species, *H. tentaculatus*, the muzzle of which is furnished with two soft prominences, covered with scales, the use of which is not ascertained. The tail s long and pointed; little is known of the habits of this species.



THE HERPETON TENTACULATUS.

PINE-SNAKE, COACH-WHIP SNAKE, &c.

Genus PITUOPHIS: *Pituophis.*—This includes the PINE or BULL-SNAKE, *P. melanoleucus*, seven to eight feet long; body milky white, clouded with black oblong blotches; abdomen pale cream-color; feeds on rabbits, squirrels, and birds; common from Maryland to Florida. It is the largest species in the United States, except the Gopher-Snake.

Genus PSAMMOPHIS: *Psammophis.*—To this belongs the COACH-WHIP SNAKE, *P. flagelliformis*, five to seven feet long; glossy black above, bluish-slate beneath. It is remarkable for the swiftness of its motions; feeds on young birds, and derives its name from the formation of the tail, which resembles whip-cord; found in South Carolina, Georgia, and Florida.

Genus CORONELLA: *Coronella.*—This includes several species. The CHAIN-SNAKE, *C. getula*, is three and a half to four feet long; the ground color rich raven-black, beautifully marked with twenty-two white transverse bars. It lives in moist places, and feeds on moles, small birds, and lizards; common in the Carolinas.

The *Coronella Sayi*, color bluish-black, tinged with violet above, has each plate and scale marked with a milk-white spot; length four feet; is found along the valley of the Mississippi.

The *C. rhombo-maculata*, of a chestnut-brown above, salmon-color beneath, is thirty inches long, and found in Georgia and Alabama.

The *C. doliata* is a very small but brilliantly colored species, fifteen inches long; scarlet, marked with black rings, above; beneath white; found in Carolina and Georgia.

Genus HELICOPS: *Helicops.*—This includes two species, the *H. erythrogrammus* and *H. abacurus*, both beautiful species, and found in the Southern States.

Genus BRACHYORRHOS: *Brachyorrhos.*—This includes the *B. amœnus*, ten to twelve inches long; light chestnut-brown above, salmon-color below; found in the Atlantic States from New Hampshire to Florida; also in Mississippi and Louisiana.

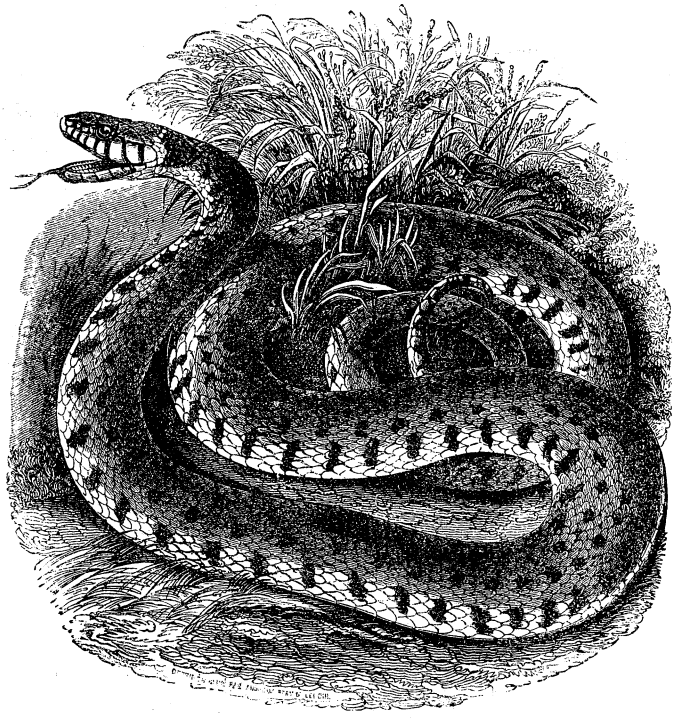
Genus RHINOSTOMA: *Rhinostoma.*—This includes the SCARLET SNAKE, *R. coccinea*, eighteen inches long; body bright vermilion, marked with black bands; found in the Atlantic Southern States.

Genus HETERODON: *Heterodon.*—The animals of this genus have the power of flattening the head and body even more than those of the genus *Tropidinotus*, and in which respect they approach the Cobra di capello. To this belongs the HOG-NOSE SNAKE, *H. simus*, fourteen to fifteen inches long; the nostrils lateral, and near the snout; color light gray, with a triple series of dusky or black spots, varying in form and size; found about the sea islands of Georgia and South Carolina.

The BLACK VIPER, *H. niger*, has nostrils like the preceding; eighteen inches long; color black above; beneath bluish-slate color; lives in pine-barrens, and is harmless, but its hiss is said to be frightful; is found in the Southern States.

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The *H. platyrhinos*, also called *Hog-Snake*, is thirty inches long; color iron-gray or brownish-yellow; lives in moist places, and feeds on toads, insects, and small reptiles; found in New Hampshire, Massachusetts and the Western States. It is sometimes called *Déaf Adder* and *Buckwheat-Vire*.



THE COMMON RING-SNAKE OF EUROPE.

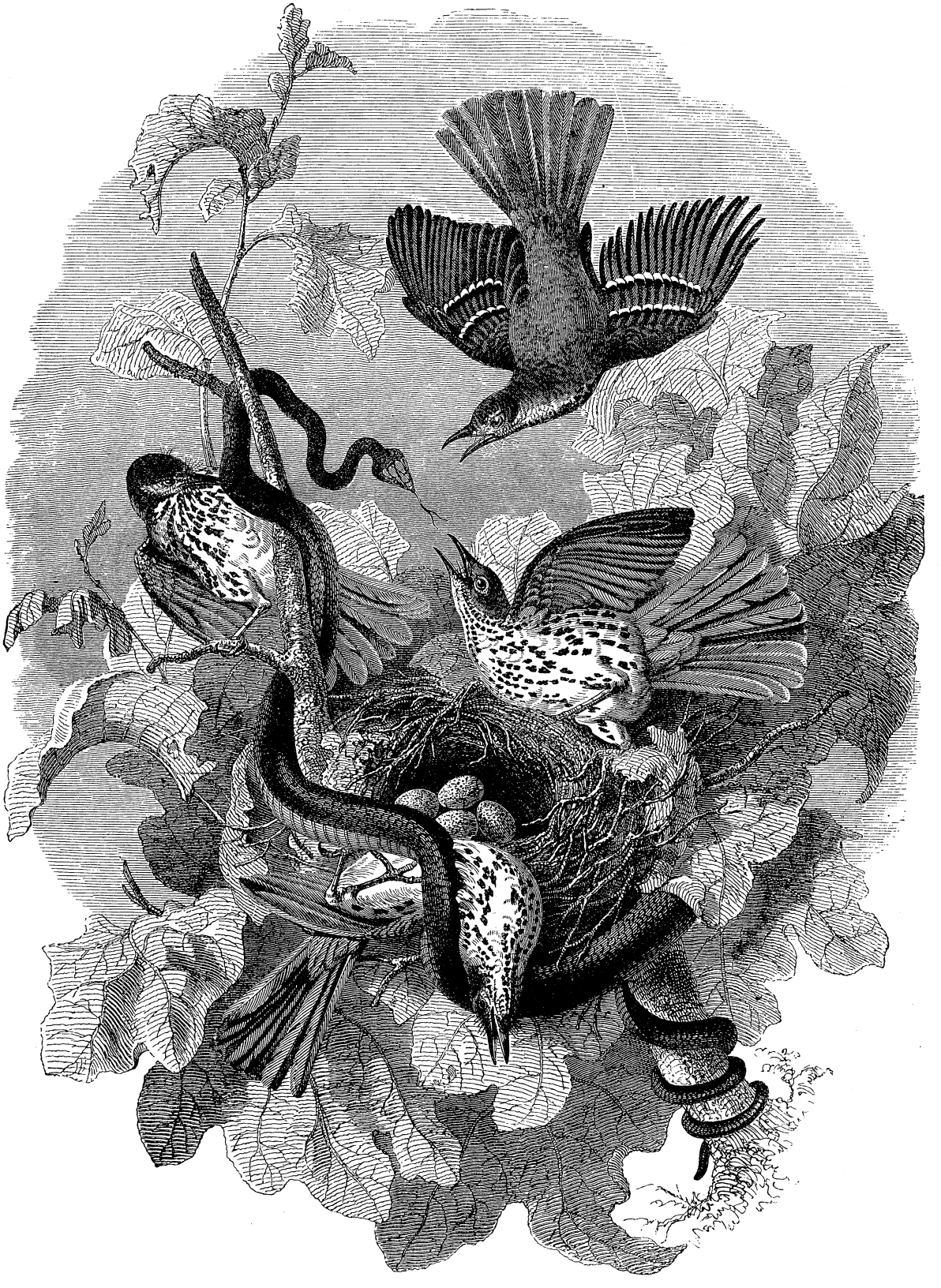
COLUBERS.

Genus COLUBER: *Coluber*.—This includes a great number of non-venomous species. The COMMON SNAKE OF EUROPE, *C. natrix*, sometimes called *Ringed Snake*—the *Couleuvre* of the French—frequents woods, bogs, and other sheltered situations in the vicinity of water. It is a handsome species, three feet long, the female, as in all ophidians, being longer than the male; above it is of a pale olive-color, spotted with black on the sides; beneath whitish. It preys on insects, worms, small birds, mice, and frogs, the latter constituting its chief sustenance. In pursuit of these it often takes to the water. It deposits its eggs in warm, moist situations, where they are often found attached together in the form of a necklace. When excited it emits an intolerable odor. This, as well as other serpents, changes its skin once, and sometimes three or four times, a year. It is easily tamed, and can be taught to eat from the hand of one who takes care of it. It is common in most parts of Europe.

There are several other species of Coluber in Europe: the largest is the *C. elaphis*, found in Italy, the south of France, &c.; it is six feet long, and is supposed by Cuvier to be the Boa of Pliny.

The BLACK SNAKE, *C. constrictor*, is one of the most remarkable of our American non-venomous serpents, and is common from Canada to Mexico. It is of rather a slender form, shining black above, and slate-color beneath; medium length four feet, sometimes as much as six feet. It feeds on frogs, toads, birds, and small quadrupeds. It is a bold, active, wild, and untamable animal. It climbs trees with facility in search of eggs and young birds. Audubon gives a description of a scene of this kind which he witnessed, in which a black snake attacked a nest of the brown thrush, but was vigorously repulsed by the parents, assisted by some of their feathered kindred. Its haunts are in dry, bushy woods; it generally retreats from man, but sometimes will make

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THE BLACK SNAKE AND BROWN THRUSHES.

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a stand, and with gleaming eyes brandish its tongue, seeming, like a forked flame, to threaten the intruder. If a person, under such circumstances, takes to flight, the serpent will often give chase, and sometimes, it is said, has coiled itself around the legs of the fugitive, and brought him to the ground. It is said, also, to kill its prey by coiling around it and crushing it to death, as is done by the boa-constrictor; this does not appear to be correct, but as the snake has been found coiled around the feet and bodies of children, many fearful stories of its attempts to strangle them have been told. There is a popular idea that there is a variety of great swiftness, which frequently gives chase to man, to which the name *Racer* has been given. This is no doubt a mistake. The power of fascinating birds has been attributed to the black snake, but without foundation. The following vivid account of a deadly battle between two serpents, one of this kind and the other a common water-snake, is furnished by an English emigrant, who had settled in the West:

"As I was one day sitting, solitary and pensive, in this primitive arbor, my attention was engaged by a strange sort of rustling noise at some paces distant. I looked all around without distinguishing any thing, until I climbed up one of my great hemp-stalks, when, to my astonishment, I beheld two snakes of a considerable length, the one pursuing the other with great celerity through a hemp-stubble field. The aggressor was of the black kind, six feet long; the fugitive was a water-snake, nearly of equal dimensions. They soon met, and, in the fury of their first encounter, appeared in an instant firmly twisted together; and while their united tails beat the ground, they mutually tried, with open jaws, to lacerate each other. What a fell aspect did they present! Their heads were compressed to a very small size; their eyes flashed fire; but, after this conflict had lasted about five minutes, the second found means to disengage itself from the first, and hurried toward the ditch. Its antagonist instantly assumed a new posture, and, half creeping, half erect, with a majestic mien, overtook and attacked the other again, which placed itself in a similar attitude, and prepared to resist. The scene was uncommon and beautiful; for, thus opposed, they fought with their jaws, biting each other with the utmost rage; but notwithstanding this appearance of mutual courage and fury, the water-snake still seemed desirous of retreating toward the ditch, its natural element. This was no sooner perceived by the keen-eyed black one, than, twisting its tail twice round a stalk of hemp, and seizing its adversary by the throat, not by means of its jaws, but by twisting its own neck twice round that of the water-snake, he pulled it back from the ditch. To prevent a defeat, the latter took hold likewise of a stalk on the bank, and, by the acquisition of that point of resistance, became a match for his fierce antagonist. Strange was this to behold: two great snakes strongly adhering to the ground, mutually fastened together by means of the writhings which lashed them to each other, and stretched at their full length; they pulled, but pulled in vain; and in the moments of greatest exertion, that part of their bodies which was entwined seemed extremely small, while the rest appeared inflated, and now and then convulsed with strong undulations, rapidly following each other. Their eyes appeared on fire, and ready to start out of their heads. At one time the conflict seemed decided: the water-snake bent itself into great folds, and by that operation rendered the other more than commonly outstretched; the next minute the new struggles of the black one gained an unexpected superiority; it acquired two great folds likewise, which necessarily extended the body of its adversary, in proportion as it had contracted its own. These efforts were alternate; victory seemed doubtful, inclining sometimes to one side, sometimes to the other, until at last the stalk to which the black snake was fastened suddenly gave way, and, in consequence of this accident, they both plunged into the ditch. The water did not extinguish their vindictive rage, for by their agitations I could still trace, though I could not distinguish their attacks. They soon reappeared on the surface, twisted together as in their first onset; but the black snake seemed to retain its wonted superiority; for its head was exactly fixed above that of the other, which it incessantly pressed down under the water, until its opponent was stifled and sank. The victor no sooner perceived its enemy incapable of further resistance, than, abandoning it to the current, it returned to the shore and disappeared."

The *Coluber obsoletus* is five feet long; the anterior half of the body black above, with a line of red spots; the posterior part lead-color; beneath white, tinged with yellowish-red. Common in the vicinity of Council Bluff.

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The Corn-Snake, *C. guttatus*, is four feet long; light brown, with a reddish tinge, above; along the back a row of squarish brick-colored spots; beneath silver-white, with irregular black squares. It conceals itself during the day, and comes forth early in the morning, or at evening, being often seen along the road-sides. It is gentle and familiar, and lives in the neighborhood of settlements. Found in North Carolina.

The Milk-Snake, *C. eximius*, is three to four feet long; ground color white above, with a series of dusky blotches, bordered with black, sometimes giving the animal the appearance of being banded with black and white; the abdomen is silver-white. It is a very handsome species, of a gentle disposition; feeds on field-mice and insects. It approaches the habitations of man without fear, and is hence sometimes called the *House-Snake*. It frequents dairies and cellars where milk is kept, and hence derives its common popular name. It is found in New England and the Middle States, and the Western States north of latitude 37°.

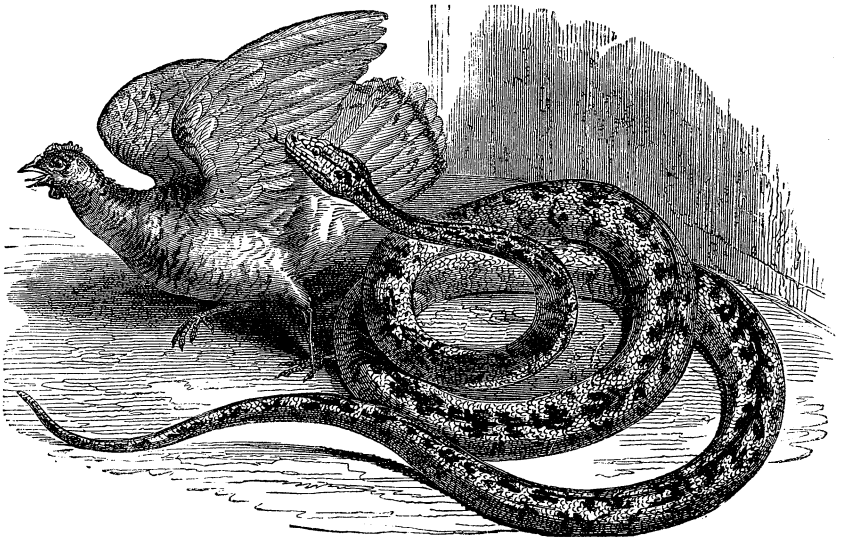
The Indigo or Gopher Snake, *C. Couperi*, is from eight to twelve feet long; color bluish-black above; slate-color beneath; an active and powerful species, perfectly harmless, but sometimes assuming a bold and threatening demeanor. It is often found occupying a hole with a species of tortoise called *Gopher*, whence one of its popular names. Common in the dry pine-hills south of the Alatamaha. It is the largest known species in the United States.

The Grass or Green Snake, *C. vernalis*, is a small species, twenty inches long, bright green above and yellowish-white beneath. It lives in meadows of high grass, feeds on crickets and grasshoppers, is perfectly harmless, and may be handled with impunity. It is common in the Southern New England and the Northern Middle States.

The Ring-Snake, *C. punctatus*, is twelve or fourteen inches long; color grayish-black above; reddish-yellow beneath; found in the Atlantic States from Maine to Florida.

The Pilot Black Snake, *C. Alleghaniensis*, six feet long, resembles the common black snake, and is said even to exceed that agile species in swiftness. Dr. De Kay thinks this has given rise to the current idea already alluded to, of a variety of the common black snake, on which the appellation of *Racer* has been bestowed. This species is found along the Alleghany Mountains as far south as Virginia.

The Chicken-Snake, *C. quarivittatus*, is four and a half to five feet long; of a greenish-clay color above, with four longitudinal brown bands; beneath yellowish. It frequents the vicinity of houses, and is charged with devouring chickens. Found from North Carolina to Florida.



THE PYTHON.

THE BOIDÆ.

We now come to the large serpents of tropical countries, which, on account of their enormous size and strength, are almost as much to be dreaded as the venomous species. We have

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already alluded to the disposition of mankind to bestow idolatrous worship on serpents. That such creatures, endowed with powers which in a semi-civilized state of society must operate powerfully on the mind; moving with freedom alike on the land, in the water, or among the trees; at once wily, daring, and irresistible in their attack, graceful in their movements and splendid in their coloring—that they should be both dreaded and admired, and become the objects of superstitious reverence, is scarcely to be wondered at. The ancient Mexicans regarded the Boa as sacred; they viewed its actions with religious horror; they crouched beneath the fiery glance of its eyes; they trembled as they listened to its long-drawn hiss, and from various signs and movements predicted the fate of tribes or individuals, or drew conclusions of guilt or innocence. The supreme idol was represented encircled and guarded by sculptured serpents, before which were offered human sacrifices:

"On a blue throne, with four huge silver snakes,
As if the keepers of the sanctuary,
Circled, with stretching neck and fangs display'd,
Mexitli sate; another graven snake
Belted with scales of gold his monster bulk."

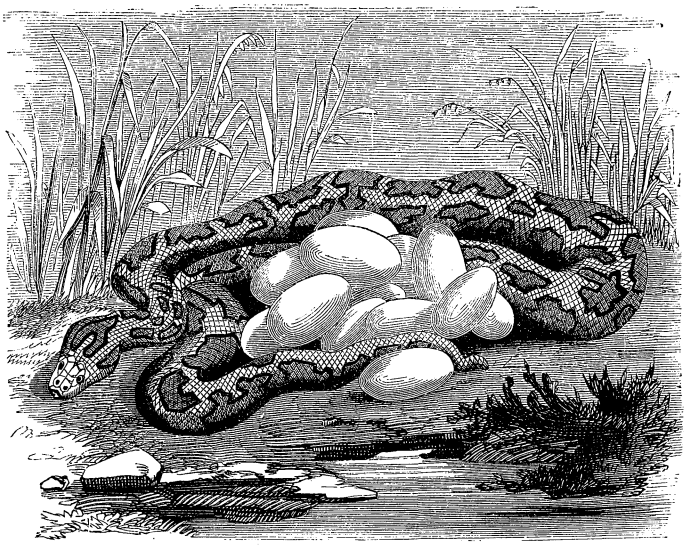
Often, however, the divinity was represented in the form of a huge serpent with a human victim in his coils, or half-ingulfed in his horrid jaws; and the priests had tame boas of great size, with which they were familiar, and which they suffered to twine around them, thereby inspiring the people with wonder, fear, and servile obedience. Southey, in his poem of Madoc, has vividly depicted such an exhibition and its effects. Neolin, the priest of the snake-god, is a prisoner in the hands of Madoc and his party, when

"Forth from the dark recesses of the cave
The serpent came: the Hoamen at the sight
Shouted; and they who held the priest, appall'd,
Relaxed their hold. On came the mighty snake,
And twined in many a wreath round Neolin,
Darting aright, aleft, his sinuous neck,
With searching eye and lifted jaw, and tongue
Quivering; and hiss as of a heavy shower
Upon the summer woods. The Britons stood
Astounded at the powerful reptile's bulk,
And that strange sight. His girth was as of man,
But easily could he have overtopp'd
Goliath's helmed head; or that huge king
Of Basan, hugest of the Anakim.
What then was human strength if once involv'd
Within those dreadful coils! The multitude
Fell prone and worshipp'd."

The manner in which these huge serpents attack their prey, doubtless contributed to the awful impressions of their powers. Mr. Broderick thus describes the killing and devouring of a rabbit by a boa in the Tower Menagerie of London, and it may be remarked that this illustrates the mode of proceeding with all these larger serpents:

"A large buck rabbit was introduced into the cage. The snake was down and motionless in a moment. There he lay like a log, without one symptom of life, save that which glared in the small bright eye twinkling in his depressed head. The rabbit appeared to take no notice of him, but presently began to walk about the cage. The snake suddenly, but almost imperceptibly, turned his head according to the rabbit's movements, as if to keep the object within the range of his eye. At length the rabbit, totally unconscious of his situation, approached the ambushed head. The snake dashed at him like lightning. There was a blow—a scream—and instantly the victim was locked in the coils of the serpent. This was done almost too rapidly for the eye to follow: at one instant the snake was motionless; in the next he was one congeries of coils round his prey. He had seized the rabbit by the neck just under the ear, and was evidently exerting the strongest pressure round the thorax of the quadruped; thereby preventing the expansion of the chest, and at the same time depriving the anterior extremities of motion. The rabbit never cried after the first seizure; he lay with his hind-legs stretched out, still breathing with difficulty, as could be seen by the motion of his flanks. Presently he made one desperate struggle with his hind-legs; but the snake cautiously applied another coil with such dexterity as completely to manacle the lower extremities, and in about eight minutes the rabbit was quite dead. The snake then gradually and carefully uncoiled himself, and finding that his victim moved not, opened his mouth, let go his hold, and placed his head opposite to the fore part of the rabbit. The boa generally, I have observed, begins with the head; but in this instance the

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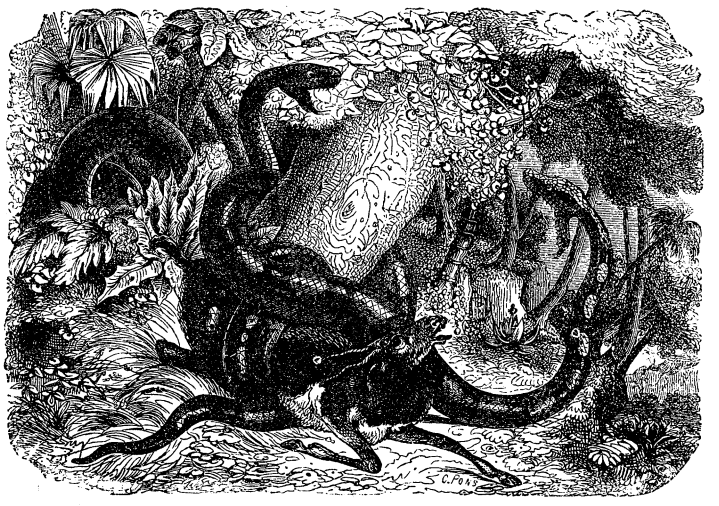
THE PYTHONESS OF THE GARDEN OF PLANTS, COILING AROUND HER EGGS.

serpent, having begun with the fore-legs, was longer in gorging his prey than usual, and in consequence of the difficulty presented by the awkward position of the rabbit, the dilatation and secretion of lubricating matter were excessive. The serpent first got the fore-legs into his mouth; he then coiled himself round the rabbit, and appeared to draw out the dead body through his folds; he then began to dilate his jaws, and holding the rabbit firmly in a coil as a point of resistance, appeared to exercise at intervals the whole of his anterior muscles in protruding his stretched jaws and lubricated mouth and throat, at first against, and soon after gradually upon and over his prey. The curious mechanism in the jaws of serpents which enables them to swallow bodies so disproportioned to their apparent bulk, is too well known to need description; but it may be as well to state that the symphysis of the under jaw was separated in this case, and in others which I have had an opportunity of observing. When the prey was completely ingulfed, the serpent lay for a few moments with his dislocated jaws still dropping with the mucus which had lubricated the parts, and at this time he looked quite sufficiently disgusting. He then stretched out his neck, and at the same moment the muscles seemed to push the prey further downward. After a few efforts to replace the parts, the jaws appeared much the same as they did previous to the monstrous repast."

Of the actual size of the larger serpents we have various accounts. Livy, the ancient historian of Rome, tells us of a serpent one hundred and twenty feet long, which was met with by the Roman army under Regulus, on the banks of the river Bagrada, in Africa, near Utica, and which devoured many of the soldiers. It was finally slain by military engines, which hurled heavy stones upon it. Its carcass was so enormous, that when it decayed, it tainted the whole atmosphere, and compelled the army to remove its encampment to a distance. The story is told with so much particularity that we cannot reject it. Another account is furnished of a serpent sixty-two feet in length which not many years since attacked a sailor in a boat on the coast of the Bay of Bengal, and was killed by the crew. At the present time, it appears that serpents of from twenty to thirty feet are not uncommon in the tropical portions of Asia, Africa, and South America.

Genus PYTHON: *Python.*—This includes the largest known serpents, which are found only in India and the islands of the Indian Archipelago. They frequently ascend trees, and lie upon the branches in a position which enables them readily to drop upon any unfortunate animals that may pass their station; and both these and the boas are said often to cling by the tail to some tree growing in the water, where they float upon the surface nearly at full length, lying in wait for creatures that may come to the water to drink. They prey upon animals of such bulk as would

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BOA CONSTRICTORS ATTACKING A DEER.

seem to render their swallowing them a matter of impossibility; yet, according to some writers, they can destroy and gorge a buffalo; but specimens capable of such feats of voracity appear to be rarely met with, although there is no doubt that a good-sized Python will easily swallow a goat or calf. The victim is destroyed by powerful compression, effected by the snake coiling its body round it, and then gradually tightening the folds. In this manner the body of the animal is reduced to a state fit for being swallowed, and this operation usually takes a considerable time. After being thus gorged with its meal, the serpent retires to some sheltered retreat, where it lies in a torpid state for some weeks; nor does it resume its activity till the digestion of its enormous repast is complete, and hunger returns to rouse it again to action.

There appear to be two species of Python, in both of which the female places her eggs in a group, and encircles and covers them with her body, an instance of which took place in the Garden of Plants of Paris a few years since, where a pair of these animals were kept. The Ular Sawad, *P. reticulatus*, is distinguished by the four front upper labial plates being pitted; the frontal plate simple; the head has a narrow longitudinal brown stripe. It is one of the most brilliant species of the whole family, its entire body being covered with a gay lacing of gold and black. It is a native of Hindostan, Ceylon, and Borneo. Several stuffed specimens are in the British Museum, and a living one in the gardens of the Zoological Society. It is said to increase till it is more than thirty feet in length, and stout in proportion. The powers of such a gigantic reptile must be enormous, and it is stated that this serpent is able to manage a buffalo. Nor are there wanting horrible instances of man himself having fallen a prey to these monsters, in modern times. We are told that a Malay proa was anchored for the night under the island of Celebes. One of the crew had gone on shore to search for betel-nut, and is supposed to have fallen asleep upon the beach from weariness, on his return. In the dead of the night his companions on board were roused by dreadful screams; they immediately went ashore, but they came too late; the cries had ceased, and the wretched man had breathed his last in the folds of an enormous serpent, which they killed. They cut off the head of the snake, and carried it, together with the lifeless body of their comrade, to the vessel. The right wrist of the corpse bore the marks of the serpent's teeth, and the disfigured body showed that the man had been crushed by the constriction of the reptile round the head, neck, breast, and thigh. The serpent which attacked the sailor in a boat on the Bay of Bengal, of which we have just spoken, was of this species.

The Rock-Snake, *P. molurus*, is generally known by the name of the *Boa Constrictor*, though it is strictly a python. It grows to a great size, and resembles the preceding in its habits. Specimens of this have frequently been seen in the menageries. It is a native of Hindostan and other parts of Asia, and also of Java.

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Genus HORTULIA: *Hortulia.*—Of this is the NATAL ROCK-SNAKE, *H. Natalensis*, which attains an enormous size.

The GUINEA ROCK-SNAKE, *H. Sebæ*, resembles the preceding; it is found in Western Africa, and is the *Fetish Serpent* worshiped by the natives of Guinea. The ROYAL ROCK-SNAKE, *H. regia*, is an inhabitant of Gambia and the contiguous country.

Genus EPICRATES: *Epicrates.*—This includes several species, known under the general name of *Aboma*. The TAMACUILLA HUILIA or ABOMA, *E. cenchria*, appears to be the serpent worshiped by the ancient Mexicans. It is of gigantic size, and has its haunts in marshy places in the tropical parts of South America; it suspends itself by the tail to some branch of a tree overhanging the water, allowing the head and body to float upon the surface. In this situation it waits patiently till some animal comes near, when it darts upon it, crushes it in its folds, and devours it at leisure.

The BROWN ABOMA, *E. maurus*, resembles the preceding, and is a native of Venezuela.

Genus XIPHOSOMA: *Xiphosoma.*—This includes a single species, the BOJOBI or GREEN BOA. This is a large and formidable serpent, whose bite produces lock-jaw, and is therefore often fatal. It is a native of tropical America.

Genus BOA: *Boa.*—Of this there are four species, all of which have been described as the *Boa Constrictor*. The true BOA CONSTRICTOR, *B. constrictor*, appears to be confined to Guiana and Brazil. Some authors consider it as the sacred serpent of the Mexicans. It is a gigantic species, and frequently devours deer, goats, and other quadrupeds of large size.

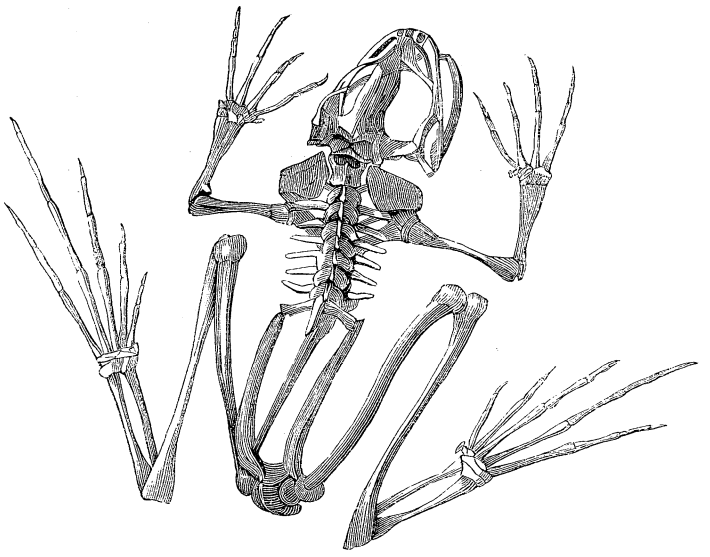
Genus EUNECTES: *Eunectes.*—This includes the ANACONDA, *E. murinus*, though it is proper to observe that the term *Anaconda*, like that of *Boa Constrictor*, has been popularly applied to all the more powerful serpents. This species is brownish, with a double series of blackish-brown blotches down the back; the lateral spots are annular and oscellated. When young it feeds on mice; at maturity it devours goats, sheep, &c. Its provincial name signifies *Deer-Swallower*. It is found in Venezuela, where it is called *Culebra de Agua*.

There are still many other genera and species belonging to the great family of Boidæ.



HINDOO JUGGLER.

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SKELETON OF A FROG.

Class IV. BATRACHIA.

In descending from the higher to the lower forms of life, we now come to a class which, while still preserving the vertebrate organization, has certain curious modifications of structure, showing an approach to the fishes, and in some cases blending the fish and the quadruped, and even presenting the same species as a fish, having a tail and breathing by means of gills in infancy, and afterward rising at maturity to the dignity of four legs, and breathing the vital air by means of lungs. Though many or most of these animals live in the slime of ponds, rivers, and ditches, and are little esteemed by mankind, they present innumerable instances of admirable contrivance in adapting them to their situations, and these are, perhaps, the more striking as they are frequent deviations from the systems which nature has followed in the higher forms of existence and those with which we are most familiar.

The Batrachia are divided into five very distinct orders: the *Anura*, of which the Frog is the type, and in which the tail is wanting in the fully developed animal; the *Urodela*, including the Salamanders and Tritons, breathing by lungs alone, and retaining the tail in the perfect state; the *Amphipneusta*, including the Sirens, having two or four legs, and permanent gills; the *Apoda*, with a vermiform body and no legs; and the *Lepidota*, having a fish-like, scaly body, four simple limbs, and permanent gills.

Though differing in many important respects, all these animals agree in having a large mouth, the tongue usually of large size, the intestinal canal short, the liver large; they all possess lungs, but during their young or larval condition they are furnished with branchiæ, in some cases these being persistent through life. The heart is composed of three chambers—a single muscular ventricle, and two membraneous auricles; but in some species the partition between the latter is imperfect. The arterial bulb is surrounded by a distinct muscular coat, as we shall see in the Ganoid and Selachian fishes; and from the continuation of this, the arteries running to the branchiæ and lungs are given off.

The Batrachia are all strictly oviparous animals, although in some species the eggs are retained in or upon the body of the parent until the young have attained a certain degree of development. As a general rule, the ova are impregnated by the male at the moment of their leaving the abdomen of the female; the eggs are united by a glutinous matter into masses or long chains, which may be constantly seen floating in the waters frequented by these animals. They are essentially inhabitants of the warm parts of the earth, and abound particularly in tropical countries.

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ORDER 1. **ANURA.**

The animals of this order, the name of which signifies *tailless*, have a short, squat body, four legs, the hinder ones the longest, a large mouth; the skin naked and extremely dilatable, in some cases furnished with glands which secrete an acrid liquid; the eyes large and prominent; the upper jaw usually armed with small hooked teeth; the tongue, though sometimes wanting, generally of large size; the spinal column short, consisting, as a general rule, of eight vertebræ. The habits are various, many living habitually in the water, while others only visit that element for depositing their ova, which give origin to tadpoles, the development of which we shall hereafter notice. We shall describe these animals under three heads: RANIDÆ, or *Frogs*, BUFONIDÆ, or *Toads*, and PIPIDÆ, or *Surinam Toads*.



THE COMMON FROG.

THE RANIDÆ.

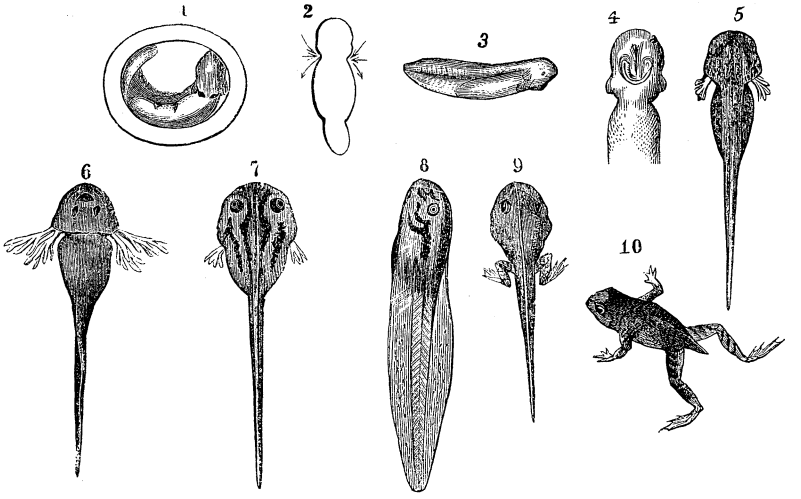
The Frogs form the highest group of the Batrachian class. They are active creatures, feeding on insects and worms. Those which live upon the ground in the neighborhood of standing water, and pass a considerable portion of their lives in the water, have their toes pointed, and those of the hinder feet united, almost to the tips, by a membrane.

Genus RANA: *Rana.*—This includes the COMMON FROG OF EUROPE, *R. temporaria*, a very abundant and well-known animal. It is constantly to be found hopping about in the neighborhood of water, especially in damp evenings. It generally deposits its eggs in the water in the month of March; they are enveloped in a mass of gelatinous matter, within which the eggs are seen gradually to increase in size for a month or five weeks, at the end of which time the young tadpoles may be seen moving. When ready to enter upon their aquatic existence, they eat their way through the surrounding jelly, and thus escape. In the course of six or eight weeks the four legs are fully formed; the tail then gradually disappears, and the young frog usually quits the water immediately. In this way they often suddenly make their appearance in prodigious numbers in particular spots, giving rise to the popular superstition of "frog rains;" and in some cases it is said that the little creatures have been taken up and carried to a distance by high winds, to the great astonishment of the inhabitants of the districts in which they afterward descended.

The production of the young of these animals is so curious as to require a more detailed description. The ova of the female are deposited in a jelly-like mass at the bottom of the water, being impregnated by the male at the time of their passage. The development of the young is

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more or less rapid according to the temperature; the greater the heat the more speedy is the process. The annexed engraving illustrates the progress of the young animal.



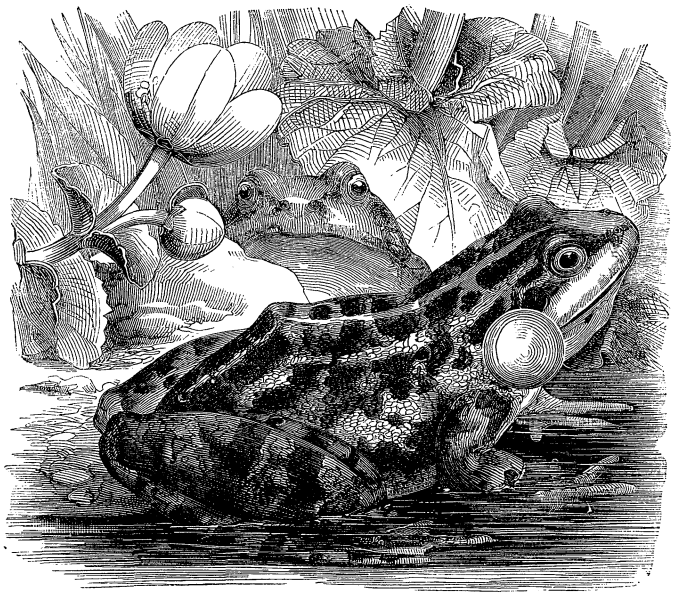
HATCHING AND PROGRESS OF THE YOUNG FROG.

Figure 1 represents the embryo as it appears several days after the egg is deposited. Figure 2 gives an outline of its form; the arrows at the side of the head show the currents of water which are seen to flow to the branchiæ by the breathing of the young animal. A short period brings it to the form represented in Nos. 3 and 4, the latter representing the head. Figure 5 shows the form of the tadpole when first hatched, which usually takes place about four weeks after the depositing of the egg. Figures 6, 7, 8, show various stages of its development; the latter representing the *tadpole*, called *pollywog* by the boys of New England; this for some time now undergoes little change of form, but increases in size. At length the hinder legs bud, and are gradually developed, as seen in No. 9; the fore-legs are ere long produced in a similar manner. The tail begins now to diminish, as seen in No. 10, and is finally absorbed into the body and disappears. The tadpole, which for a time was like a fish, and breathing by branchiæ or gills, and feeding on the vegetable food of fishes, is now a frog, breathes the air by true lungs, and betakes itself to the land, where it pursues the avocations of its new and higher life. Whereas it before swam by means of a tail, it now leaps, and as before it ate only roots and grass, it now becomes a hunter of insects and worms. This, or a very similar process of reproduction is common to all the species of this family.

The common frog is said to be five years in attaining its full size, and its life is supposed to extend to twelve or fifteen years. It passes the winter in a state of torpidity, either in holes in the earth, or buried in the mud at the bottom of ponds, without the possibility of feeding or breathing. The voice of the frog is a peculiar hoarse cry, well known as *croaking*. In the males there is a large sac on each side of the neck, which is inflated with air during the croaking, and probably serves to increase the sound.

The species of frogs are very numerous, and distributed very widely over the globe; they are especially abundant in tropical countries. Their habits are generally very similar to those of the common frog. Notwithstanding the popular notion to the contrary, frogs are said by Bell to be found in Ireland, though they were probably introduced from England more than a century ago. Of the European species, the most celebrated is the Edible Frog, *R. esculenta*, which is exceedingly common in standing water on the continent, although in England it appears to be rare. It is rather larger than the common frog, and its nocturnal croakings are so loud and disagreeable, that temporary dwellers in the neighborhood of ponds frequented by it, are often prevented from sleeping by its clamorous chorus. It is this species that is most approved of on the continent for culinary purposes. It is very extensively used in France.

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THE EDIBLE FROG OF EUROPE.

Among the numerous frogs in this country we need but notice the most remarkable species. The Bull-Frog, *R. pipiens*, six to twelve inches long, is notorious for its loud croakings, often heard for a mile. It is entirely aquatic, though it commonly rests on the banks of the lakes and rivers it inhabits. In the tadpole state it feeds on vegetable substances; when adult, it devours insects, crawfish, and small fish. It is generally distributed throughout the Union. The Large Northern Bull-Frog, *R. Horiconensis*, is found in Lake George.

The Spring Frog, *R. fontinalis*, is three to four inches long; brilliant green above, belly pearly white; lives in the vicinity of clear pools and clear running streams; feeds on water-insects and others; is the earliest to appear in spring; found in the Northern and Middle States.

The Marsh Frog, *R. palustris*, is a beautiful and active species, but the flesh has a disagreeable odor. It is used for fish-bait, and is called the *Pickerel-Frog;* also the *Tiger* and *Leopard-Frog*, on account of its markings. It is three inches long: found from Maine to Virginia.

Other northern species are the Shad-Frog, *R. halecina*, and the Wood-Frog, *R. sylvatica*.

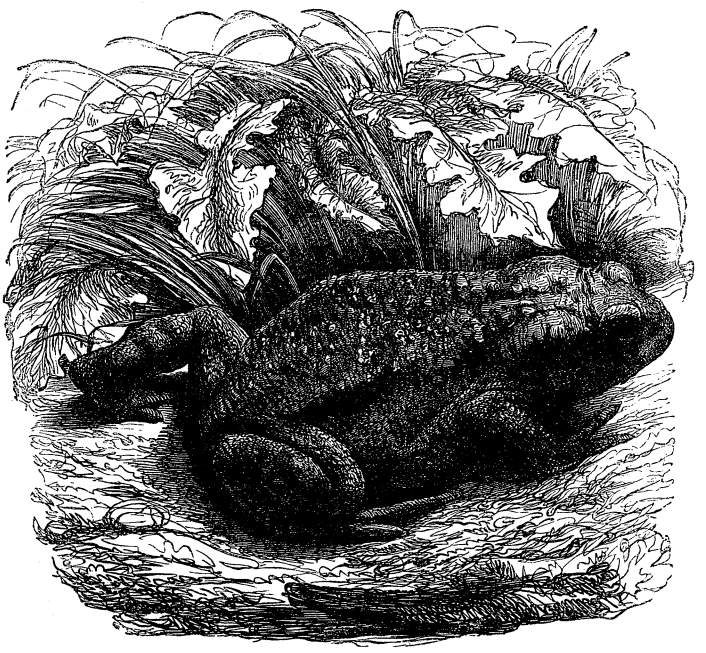
Genus SCAPHIOPUS: *Scaphiopus.*—This includes the Hermit Spade-Foot, *S. solitarius*, having the teeth of a frog and the parotid glands of a toad. It is two inches long; lives in small holes, which it excavates in damp earth; feeds on insects; found from Massachusetts to the Carolinas.

In the Southern States there are several genera of Ranidæ, the species of which abound in the swamps, ponds, and rivers. The clamor of these in the spring-time, as evening approaches, affords one of the most extraordinary concerts that can be conceived. The mingling of the voices, some loud and hoarse, some fine and piping, some slow, and some fast, produces a strange and not unpleasing harmony, proceeding from discord and confusion. Some of the performers in the serenade, as if anxious to obtain applause, send forth their jigging and jerking melodies high above the general din, and he must be a stern man who, on hearing them for the first time, fails to break out into a hearty laugh.

THE BUFONIDÆ.

The Toads have a well-developed tongue, which distinguishes them from the frogs; the body is thick and heavy, and is covered with glandular warts, which secrete an acrid juice; this is offensive to dogs, and renders them reluctant to attack these animals; but they are not venomous or poisonous. The toads are unlike the frogs in being without teeth. They generally come

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THE COMMON EUROPEAN TOAD.

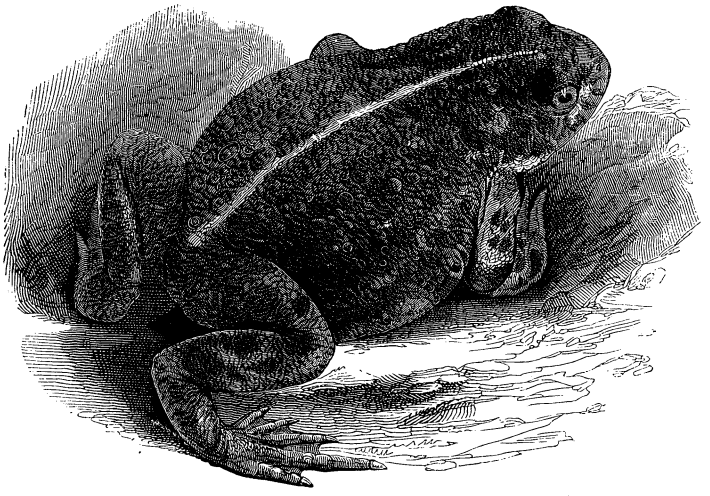
abroad at evening in search of insects, which they catch by darting out their long tongues with the quickness of lightning. They swallow their food alive, and often their sides may be seen to twitch with the tickling caused by a large beetle struggling in the stomach. During winter they lie in a torpid state, concealed in holes and under stones. In the spring the female deposits her eggs in immense numbers, which, instead of being inclosed in a gelatinous mass, as in the frogs, are inclosed in a similar substance, but in long strings like necklaces. These are drawn out of the body of the female by the hind-feet of the male. The process of development is similar to that of the frogs.

Genus BUFO: *Bufo.*—This includes the COMMON TOAD OF EUROPE, *B. vulgaris:* it is a harmless animal, though its ungainly appearance has made it the subject of general aversion. When it is about to feed, it remains motionless, fixing its eyes intently on its insect prey; when the latter moves, the toad shoots forth its long tongue, quick as thought, and rarely fails to secure the prize. It is well known that toads can live for a long time without food, and it has been supposed also without air. Instances have occurred of these animals having been found imbedded in indurated clay, the solid trunks of trees, and even in rocks, where it was believed they had remained for years, perhaps for ages; yet, on being liberated, came fully to life. The general opinion of scientific naturalists is, that these accounts are either untrue or inaccurate. They believe that toads may subsist for a long time, perhaps for years, with very little food or air, and that they may have been found apparently inclosed in solid substances, but that in point of fact there was some crack or crevice through which they obtained air and small insects sufficient to support life.

The NATTER-JACK TOAD of Europe, *B. calamita*, resembles the preceding in appearance: there are also other foreign species, among which is the ACCOUCHEUR TOAD, *B. obstetricans*, which not only assists the female in excluding her eggs, but attaches them afterward to his own hind-legs, where the young are developed until they arrive at the tadpole state, when he visits the water and they escape. This species is common in the vicinity of Paris.

The COMMON AMERICAN TOAD, *B. Americanus*, closely resembles the common toad of Europe, and is found in the Northern, Middle, and Western States. In the South there are three or four species; the *B. cognatus* is found along the Upper Missouri.

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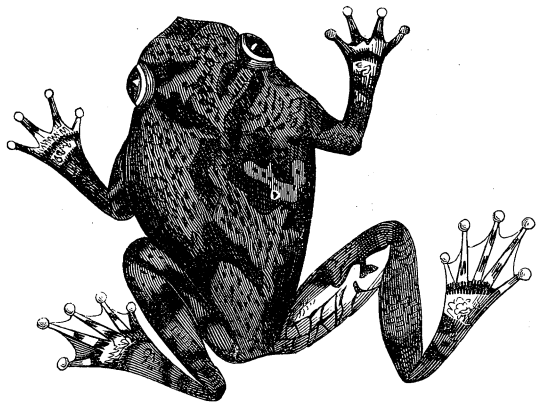


THE NATTER-JACK TOAD.

Genus HYLODES: *Hylodes.*—To this belongs PICKERING'S HYLODES, *H. Pickeringi;* brown above, the color, however, apparently varying at the will of the animal; feeds on small flies; length of head and body one inch; including the legs three inches. It is found on the leaves of Indian corn, and in grape-houses under the leaves of plants, during the heats of summer; ranges from Massachusetts to Pennsylvania.

The CRICKET HYLODES, *H. gryllus*—called *Peeper* and *Cricket-Frog* in New York, and *Savannah-Cricket* at the South—is a lively, noisy species, frequenting moist wooded places, and is often seen on aquatic plants. It is never found on trees, and cannot adhere to the under side of smooth surfaces. The *H. ocularis* is a small species found at the South.

Genus HYLA: *Hyla.*—This includes the NORTHERN TREE-TOAD, *H. versicolor*, two inches long; body robust, eyes large, color changing from gray to green at the will of the animal. It feeds on insects, and lives almost exclusively on trees, and during damp weather is particularly clamorous. The toes terminate in round pellets, which operate like a boy's sucker, and enable it to adhere to smooth surfaces, as the leaves and bark of trees, even with its back downward. It is shy, and takes long leaps, and often alights on perpendicular objects. It possesses great ventriloquial powers, and frequently deceives the ear of a person who is in pursuit of it. This, with its changes of color, which assimilate it to the complexion of the object on which it rests, renders its capture difficult. Found from Maine to Virginia, and in some of the Western States.



THE SQUIRREL TREE-TOAD.

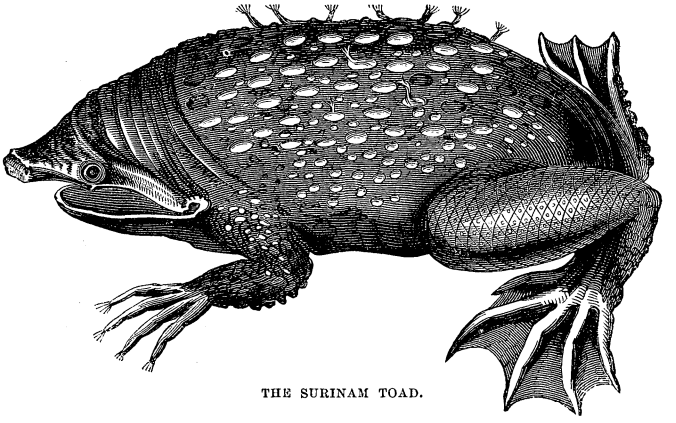
The SQUIRREL TREE-TOAD, *H. squirella*, is of a brownish or light ash-color, and is found under logs and the bark of decayed trees. It is a southern species. Length, one inch and a quarter.

The *H. femoralis*, *H. delitescens*, and *H. viridis* are found in the Southern States.

THE PIPIDÆ.

This family includes the genus PIPA: *Pipa*, of which the SURINAM TOAD, *P. Americana*, is a noted example. This is without a tongue, and of a hideous appearance. At the breeding season the back of the female exhibits a number of small pits; into these the male collects the

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THE SURINAM TOAD.

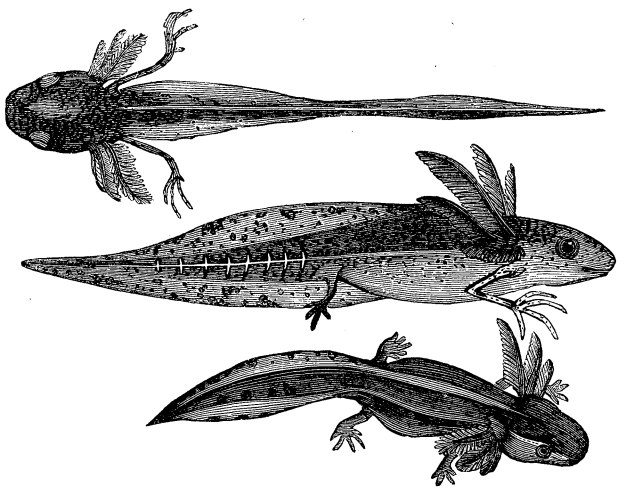
eggs laid by the female in the edge of the water, and presses them down; they are then covered by a natural operculum, and there they are hatched, in the same manner as the free larvæ of the other Batrachians. Notwithstanding the hideous aspect of this species of toad, the people of Guiana and Surinam, where it is found, feed upon it.

ORDER 2. **URODELA.**

The term *Urodela* signifies *having a tail*, and is descriptive of the animals of this order; it includes two families, the first bearing the general name of SALAMANDRIDÆ, which are usually divided into two groups, the aquatic salamanders, called *Tritons*, and the terrestrial salamanders or *True Salamanders;* the other family consists of the AMPHIUMIDÆ. We can only notice a few prominent species.

THE SALAMANDRIDÆ.

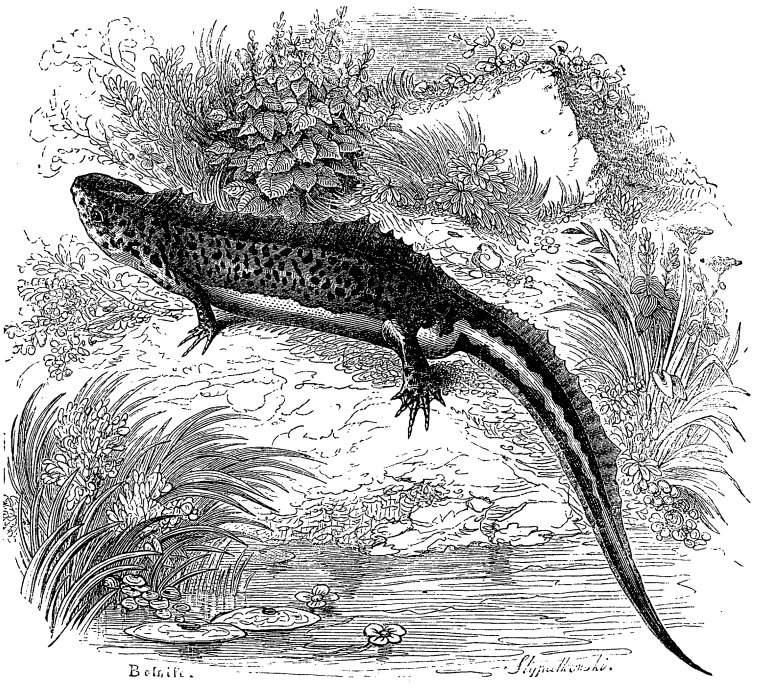
Genus TRITON: *Triton.*—This includes several species, which spend a great part of their time in the water and generally live on aquatic insects. In the winter, they lie in a torpid state, several of them rolled up together like a ball, and occupying some hole in the ground.



DEVELOPMENT OF YOUNG WARTY-NEWTS.

The COMMON WARTY-NEWT OF EUROPE, *T. cristatus*—the *Grosse Wasser-Salamander* of Germany, *Salamandre* of the French—is six inches long, and is common in large ponds and ditches, where it feeds voraciously on aquatic insects and other small animals, as tadpoles, newts, &c. It swims chiefly by its tail. The female deposits her eggs one by one, on different leaves, in the water; ere long they are hatched, and, in their various stages of development, display the forms as represented in the annexed engraving. After passing through several transformations, in which they have had the appearance and functions of fishes, at length, toward the close of autumn, they reach their perfection, and arrive at the dignity of reptiles. This species is common in Europe. The other species pass through similar metamorphoses.

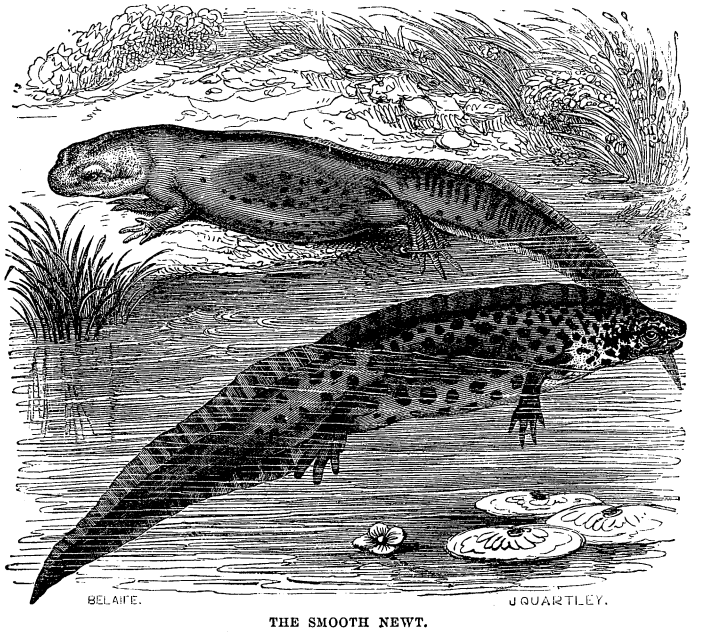
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THE COMMON WARTY-NEWT OF EUROPE.

The Strait-lipped Warty-Newt, *T. Bibronii*, resembles the preceding, and was till lately confounded with it. Common in Europe.

The Tiger Triton, *T. tigrinus*, is six to seven inches long, body robust, cylindrical, and smooth; fore-feet short, with four toes; tail long; color above bluish-black: occasionally found in de-



THE SMOOTH NEWT.

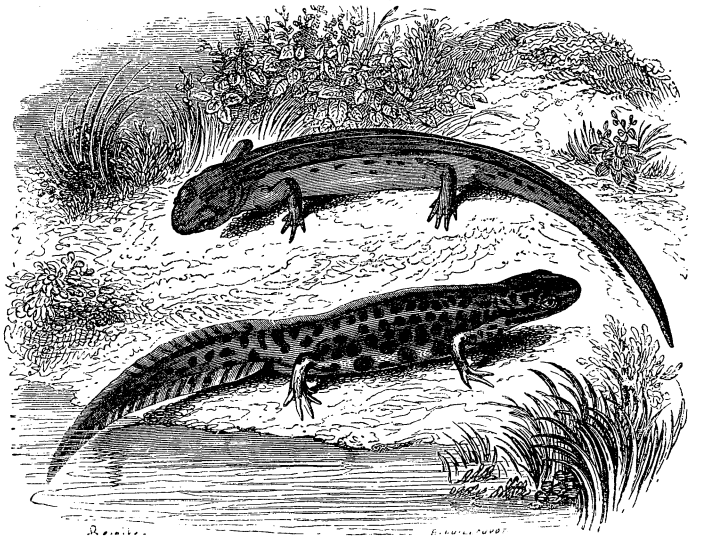
cayed hollow trees; met with in Western New York. Other species are the Crimson-spotted Triton, *T. millepunctatus*—sometimes called *Evet*—three to four inches long; found in the

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brooks of New York and neighboring states: the DUSKY TRITON, *T. niger*, five to six inches long; found in wet and springy places near running streams; habitat as the preceding: the GRAY-SPOTTED TRITON, *T. porphyriticus*, seven inches long, exceedingly active, concealing itself under rocks and stones in moist places; found in the State of New York and vicinity. The *T. ingens* is eleven inches long and found in the region of New Orleans: the *T. Jeffersoni* is seven inches long, and found in Pennsylvania.

Genus LISSOTRITON: *Lissotriton.*—To this belongs the SMOOTH NEWT, *L. punctatus*, called *Eft* and *Evet* in England. It is three and a half inches long, the skin smooth as a frog's; it lives in ponds and ditches, and is devoured in great quantities by fish of various kinds. The PALMATED SMOOTH NEWT, *L. palmipes*, resembles the preceding; both are European species.

There are several other genera of Triton in different parts of the world. Their tenacity of life is wonderful; some of the species may be mutilated, and will reproduce the lost members.



SALAMANDERS.

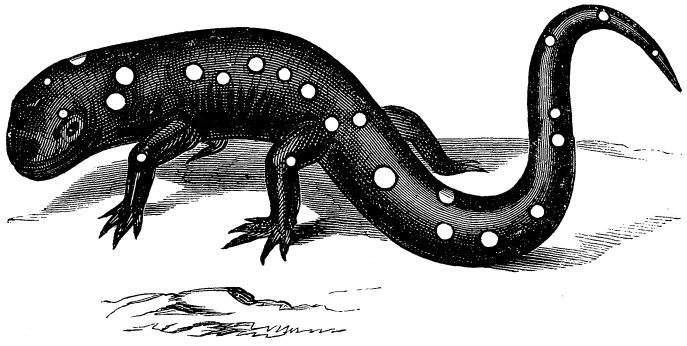
The Land Salamanders, unlike the Tritons, are ovo-viviparous, though the young at first inhabit the water and undergo metamorphoses till they arrive at the mature state which fits them for living upon land, where they haunt cool and moist places, being not unfrequently found about fallen timber or old walls. Their food principally consists of insects, worms, and small molluscous animals. In the winter they retire to some hollow tree or hole in an old wall, or even in the ground, where they coil themselves up and remain in a torpid state till the spring again calls them forth.

Genus SALAMANDRA: *Salamandra.*—This includes the SPOTTED SALAMANDER, *S. maculosa*, distributed over Central Europe, and Northern and Western Asia, and the subject of many ancient superstitions. It is six to seven inches long, and feeds on flies, worms, snails, and beetles. The body is covered with warty glands, which secrete a milky fluid of a glutinous and acrid nature like that of the toad, and which, if not capable of affecting the larger and more highly-organized animals, appears to be a destructive agent to some inferior species. Thus Laurenti provoked two gray lizards to bite a salamander, which at first attempted to escape from them, but being still persecuted, ejected some of this fluid into their mouths; one of the lizards died instantly, and the other fell into convulsions for two minutes, and then expired. Some of this juice was introduced into the mouth of another lizard; it became convulsed, was paralytic on the whole of one side, and soon died. This power is the only foundation for the long-cherished notion that the Salamander was one of the most venomous of animals. Nicander, in his *Alexipharmaca*, gives an appalling picture of the symptoms produced by its bite. The Romans looked

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on it with horror, as most destructive; and considered it as deadly a part of the poisoner's laboratory as aconite or hemlock. Hence came a proverb, that he who was bitten by a salamander had need of as many physicians as the animal had spots; and another more hopeless: "If a salamander bites you, put on your shroud."

Not only was its bite considered fatal, and the administration of the animal itself, taken internally, believed to be deadly, but any thing that its saliva had touched was said to become poisonous. Thus, if it crept over an apple-tree, it was supposed to poison all the fruit with its saliva; and even herbs on which the fluid fell were believed to affect those who tasted them with vomiting. These fables had taken such strong hold, that it was thought worthy of record in the "Acts of the Academy of Natural Curiosities," that a man had survived after eating a salamander, which his wife had put into his food in hopes of thereby becoming a widow. But the grand absurdity was the belief that the salamander was incombustible—an idea which had no other foundation than that a copious secretion of the fluid above named, might damp the flames. Another fable was that the saliva of the salamander was a depilatory, and of such power as to remove even the most luxuriant tresses. Its heart was worn as an amulet, and was used in medicine as a cure for leprosy; it also was supposed to have the faculty of transmuting quicksilver into gold.



THE VIOLET-COLORED SALAMANDER.

The species of salamander in the United States are numerous. The Yellow-bellied Salamander, *S. symmetrica*, is three inches long, reddish-brown above; it is found under stones and decayed wood; common from Maine to Florida. The Violet-colored Salamander, *S. sub-violacea*, is five to seven inches long; bluish-black, with bright yellow spots; habits nocturnal, living under rocks, stones, and decaying trees; found from Maine to Maryland. The Red-backed Salamander, *S. erythronota*, three and a half inches long, runs rapidly, is seen among the leaves in moist wooded districts, and conceals itself under stones and decayed trees; found from Northern New York to South Carolina. The Painted Salamander, *S. picta*, four and a half inches long, dark slate above; inhabits shallow streams; found from Massachusetts to Pennsylvania. The Salmon-colored Salamander, *S. salmonea*, five and a half inches long, color reddish-brown; found in New York and the New England States. The Blotched Salamander, *S. fasciata*; color gray, with bluish-black blotches; length five inches; found from Massachusetts to Carolina, also in Ohio. The Long-tailed Salamander, *S. longicauda*, length six inches; found in Pennsylvania and Ohio. The Granulated Salamander, *S. granulata*, six to seven inches long, greenish-slate color; found in Pennsylvania. The Striped-backed Salamander, *S. bilineata*, three inches long, brownish-yellow; found from New York to Pennsylvania, and also in Ohio. The Red Salamander, *S. rubra*, four and a half inches long, red, with numerous black dots; a common species in the Middle States. The Scarlet Salamander, *S. coccinea*, two to six inches in length, bright scarlet; found in Western New York. The Blue-spotted Salamander, *S. glutinosa*, four to six inches long, bluish-black; found from Massachusetts to Pennsylvania, and also in Ohio.

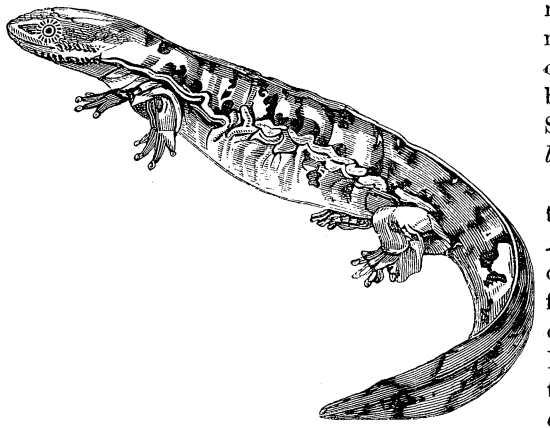
There are several other species of these curious little animals in the Middle, Southern, and Western States.

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THE AMPHIUMIDÆ.

This family includes several very curious animals having a persistent tail, and four small legs sometimes armed with claws; there are no external branchiæ, and the lungs are well developed. They are partial to the mud of shallow waters, and are chiefly found in the United States.

Genus AMPHIUMA: *Amphiuma.*—In these the body is eel-shaped, legs feeble and rudimentary, with two or three jointless toes; no ribs; two rows of teeth in the upper and one in the lower jaw. The *A. means* is dark brown, one to three feet long; found from South Carolina to Mexico. The *A. trydactylum* is similar to the preceding.



THE ALLEGHANY HELL-BENDER.

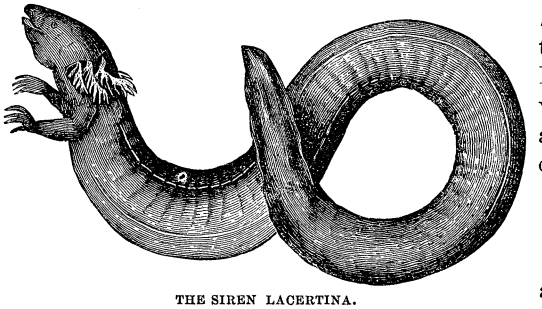
Genus MENOPOMA: *Menopoma.*—To this belongs the ALLEGHANY HELL-BENDER, *M. Alleghaniensis.* It is one to two feet long, dark slate color, feeds on worms, crawfish, fishes, and aquatic reptiles. It is very voracious, and nothing it can master is spared. It is dreaded by the fisherman, and is believed to be poisonous; the popular notions of it are expressed in the various names of *Mud Devil*, *Ground Puppy*, and *Young Alligator.* It inhabits the Ohio and its tributaries, and also the Alleghany river.

ORDER 3. **AMPHIPNEUSTA.**

In this the animals have a naked skin, an elongated body produced into a permanent tail, and the limbs more or less developed. They have also permanent branchial organs, which project from the sides of the neck. They are divided into two families, the SIRENIDÆ and PROTEIDÆ.

THE SIRENIDÆ.

These have only two legs; the body is long and somewhat cylindrical.



THE SIREN LACERTINA.

Genus SIREN: *Siren.*—To this belongs the *S. lacertina* of South Carolina and Florida; two feet long, black above and dusky beneath. It is of an eel-like form, lives in the muddy water of the rice swamps, and feeds on worms and insects. There are several smaller species in the same regions.

THE PROTEIDÆ.

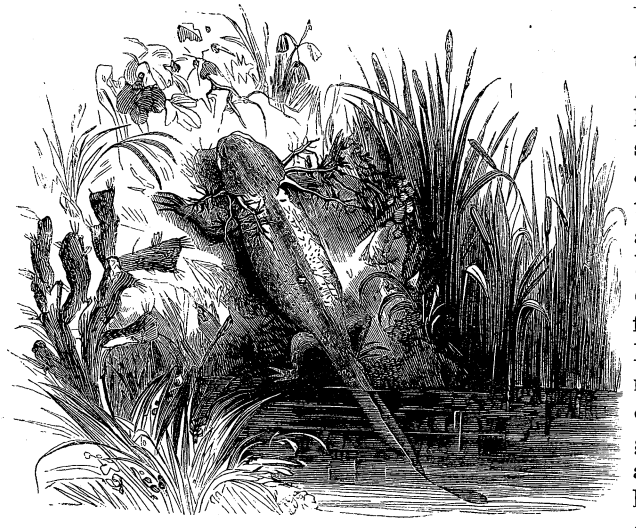
These have a compressed tail, large branchiæ and four legs.

Genus HYPOCHTHON: *Hypochthon.*—To this belongs the PROTEUS of EUROPE, *H. anguinus*, a foot long, and of the size of a man's finger; it is generally flesh-color, but sometimes white; the eyes are small and hidden beneath the skin, the legs four, small and weak. It swims easily, with a leech-like undulation of the body. It is found in the muddy waters of certain caves in Carinthia, Austria, several hundred feet below the surface. The eyes are useless for vision; when in captivity this creature avoids the light and seeks dark places.

Genus MENOBRANCHUS: *Menobranchus.*—To this belongs the BANDED PROTEUS, *M. lateralis*, one to two feet long, body cylindrical and smooth, color brownish, spotted with black;

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common in the western waters of New York, and in those of Ohio. It is popularly called the *Big Water Lizard.*

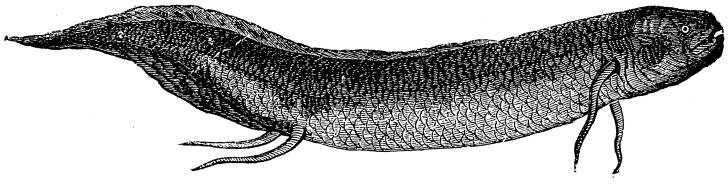


THE AXOLOTL.

Genus SIREDON: *Siredon.*—To this belongs the AXOLOTL of MEXICO, *S. pisciforme*, ten to fifteen inches long, of a brownish or grayish color, spotted with black. On each side of the neck there is a large aperture, within which there are branchial arches: there are also projecting branched gills attached to the opercula or flaps, which close these orifices. It is common in the Lake of Mexico, and also in the lakes of the neighboring mountains. It is cooked like eels, and is regarded as a great luxury. It was so plentiful at the time of Cortez' invasion that he is said to have fed his army upon it.

ORDER 4. **APODA.**

The term Apoda signifies *without feet.* The animals belonging to this order, in the form of the body, closely resemble large earth-worms; they are totally destitute of limbs, and covered with a soft, viscous skin, which is annulated and wrinkled, and contains numerous minute horny scales, exactly resembling those of fishes. They form a single family, the *Cœciliidæ*, that is, *Blind-worms*, so called in consequence of the minute size and occasional absence of the eyes. They live in the tropical regions of both hemispheres, where they burrow in marshy ground, like earth-worms, in pursuit of the larvæ of insects, upon which they feed. The species generally measure from one to two feet in length; but Cuvier states that he possessed the skeleton of a Cœcilia which was more than six feet in length, and contained two hundred and twenty-five vertebræ.



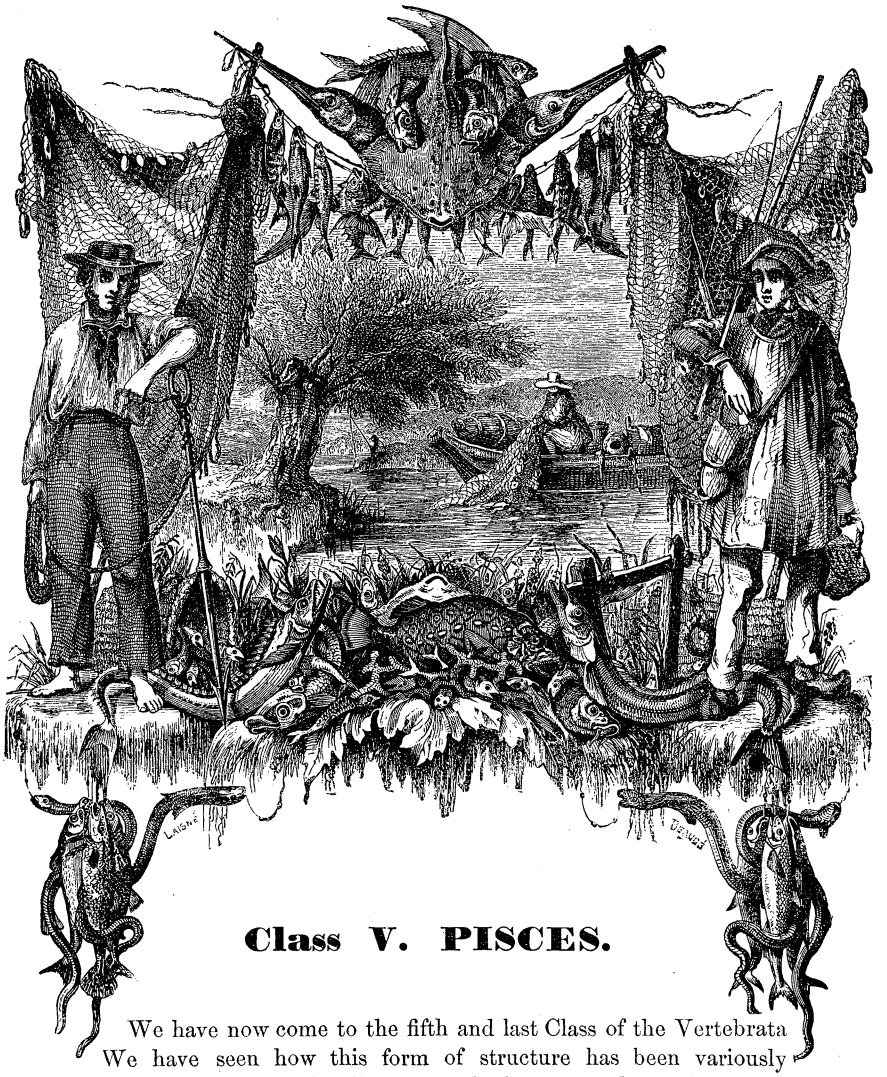
THE LEPIDOSIREN PARADOXA.

ORDER 5. **LEPIDOTA.**

The name of this order signifies *small-footed;* the animals belonging to it have a fish-like form, covered with scales laid over each other, like those of fishes; the legs are simple styliform organs. The organization is, however, rather that of the Batrachia than that of the fishes.

Three species are known; they are found in the fresh waters of the hot regions of South America and Africa. The South American species, *Lepidosiren paradoxa*, is between two and three feet in length; another species, the *L. annectens*, about a foot long, is found in the river Gambia. During the dry season these creatures bury themselves in the mud; and one of them is said to make itself a sort of nest in which to pass the period of torpidity. In these burrows they await the return of the wet season, which recalls them to their aquatic life. The Gambian species is said to pass nine months of the year in its torpid state.

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Class V. PISCES.

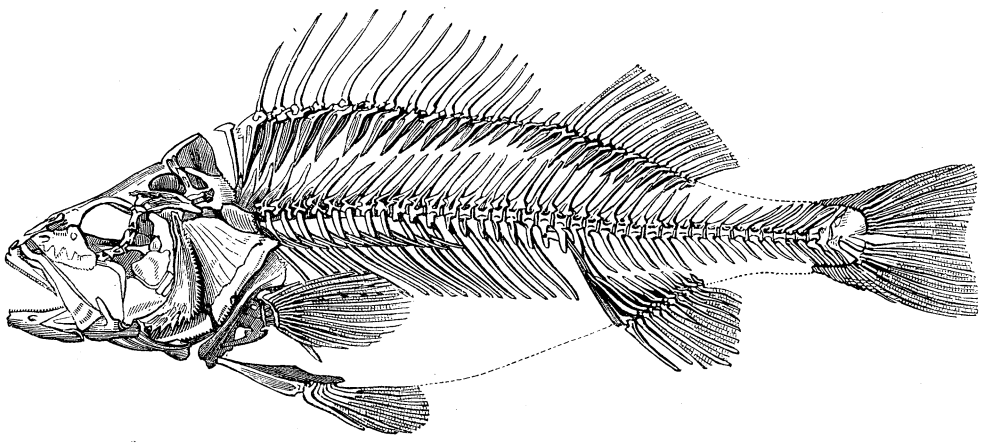
We have now come to the fifth and last Class of the Vertebrata We have seen how this form of structure has been variously adapted to many kinds of animals that live upon the land, and those which spend a great part of their time in the air; we have also noticed the curious modifications suited to animals that live in the water yet breathe the vital air, as well as those which are amphibious and partake somewhat of the two modes of respiration, by branchiæ and lungs. But we now approach a class of innumerable species, to which the oceans, seas, lakes, and rivers are a perpetual home—those which live in the water and perish as speedily when taken from it, as the air-breathing animals would on being immersed in it; those, in fact, which breathe exclusively by means of water instead of air.

A Fish may be defined as a Vertebrate animal breathing through the medium of water, by means of branchiæ, or gills, having one auricle and one ventricle to the heart, cold red blood, and extremities formed for swimming. In considering fishes, perhaps the most important thing which offers itself to our attention is the breathing apparatus, called the *branchiæ*. They are situated on each side of the neck, and consist of numerous laminæ fixed on arches. These laminæ are covered with innumerable blood-vessels, and are so constructed as to present a considerable surface to the water, so that the blood may receive a sufficient portion of the oxygen contained in that element. As the water in contact with the gills becomes deteriorated, it is necessary that a constant current be caused to flow over them. In most fishes this is effected

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by their taking the water in at the mouth and expelling it from under the gill-covers. The blood, which is constantly sent to the branchiæ from the heart, is distributed by means of the arteries to every part of the body, whence it returns to the heart by means of the veins.

As the breathing apparatus in the fish is suited to aquatic habits, so likewise is every part of its structure. The body is generally of an elongate, oval, compressed form, covered with scales directed backward, and furnished with fins, thus being beautifully adapted for swimming. Many fishes, moreover, have an *air-bladder* filled with air, situated immediately beneath the spine, by the dilatation or compression of which their specific gravity is said to be varied. The thoracic part of the body is thrown forward toward the head, so that the fishes may be said to have no neck, and thus the hinder part of the body is more free and fitted for motion. The limbs are formed into fins, the fore-legs constituting what are termed the *pectoral fins*, and the posterior extremities the *ventral*; besides these fins, ordinary fishes are furnished with one or two *dorsal fins*, an *anal fin*, and a *caudal fin*, or tail.



SKELETON OF THE PERCH.

All these fins are not always present, nor when present are they always in the same relative positions; both the absence of certain fins, and the peculiar position of these organs, afford characters in the classification of fishes. The fins consist of a thin elastic membrane supported by rays. The rays are of two kinds: those which consist of a single bony piece, usually hard and pointed, are termed *spinous rays;* and when they are formed of numerous portions of bone united by articulations, and frequently divided longitudinally into several filaments, they are called *flexible rays*. The principal organ of motion is the tail; the dorsal and ventral fins apparently serve to balance the fish, and the pectorals to arrest its progress when required.

The bones of fishes are of a less dense and compact nature than in the higher order of animals; in some, indeed, they are wholly cartilaginous. The skeleton may in general be divided into four chief parts—the *Vertebral Column*, the *Head*, the *Respiratory Apparatus*, and the *Limbs*. The Vertebral Column consists of vertebræ which are concave at each end and pierced in the middle; and when joined together the hollow space between each two is occupied by a gelatinous substance, which passes from one space to the next through the hole in each bone. This hole is usually very small, but in some it is so large that the bones of the vertebræ are mere rings. To the vertebræ are attached the *Ribs;* in fact the ribs are the main support of all the other bones. The *Head* varies more in form than in any other class of vertebrate animals. The same bones as those found in other oviparous animals are almost always traceable. The gills are furnished with an *Operculum* or *Gill-cover*, on each side, the function of which is to close the aperture in case of need, and thus protect those delicate and important organs. There are several bones adapted to this particular organization.

The teeth in fishes are entirely osseous, and are usually of a simple spine-like form. The

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Scales are composed of two substances, one resembling horn in its texture, and the other of a harder and bone-like nature; they are generally attached to the skin by the anterior edge, and consist of numerous concentric laminæ, secreted by the skin, the smallest of which are first formed. Certain scales, forming a continuous series, in a slightly-waved line from the head to the tail of the fish, are pierced in or near their center, and furnished with a tube through which a slimy matter is poured, which serves to lubricate the body of the animal. This series of tubes forms a line visible on the sides of the body, and which is termed the *lateral line.*

The structure, form, and position of the scales of fishes are very variable, and have furnished M. Agassiz, in his celebrated *Recherches sur les Poissons Fossiles*, with characters for a new classification of these animals.

As regards the senses, the organs of which are as usual placed upon the head, those of *Taste* and *Touch* appear to be but slightly developed in fishes. When we find the tongue thickly covered with teeth, as is often the case, and used as an organ of prehension, and when we consider the rapid manner in which the food is swallowed, it would certainly appear that their sense of taste is very slight. The sense of touch is probably most developed in the cirrhi attached to the mouth of those which possess them. The long filaments with which the fins of some fishes are furnished also perhaps serve, through the sense of touch, to indicate the vicinity of weeds, or other objects in the water. The *Eyes* are differently situated in the various species of fishes, in accordance with their habits; for the most part they are placed laterally, and in some, those that live at the bottom of the water, we find them directed upward. In some of the species of sharks they are situated at the end of an elongated lateral process on each side of the head. The *Sight* in fishes is acute; the range of vision, however, is probably somewhat limited. The eyes, which are furnished with a spherical lens, are generally large, but in some species they are very small, while others are destitute of them. Although fishes appear not to possess certain portions of the auditory apparatus observed in animals of a higher grade, they nevertheless have the sense of *Hearing* in some degree. There are reasons for the belief that the sense of *Smell* in fishes is tolerably acute; their olfactory nerves are of large size, and disposed over a considerable extent of surface.

By far the greater number of fishes are of carnivorous and predacious habits, attacking and destroying indiscriminately all the weaker inhabitants of the water, such as insects, worms, crustacea, and mollusca, and devouring with avidity the smaller individuals of their own class. As there is no instinct to restrain the community of fishes, so there is no moral law to regulate it. Appetite and might are the only measures of conduct alike with the shark and the minnow. There are a few, however, which feed upon vegetable substances, and we find the stomach modified accordingly, as in other animals.

The *Sexes* of fishes, if we except the sharks and rays, offer no very decided external characters by which they may be distinguished; as in the higher animals, however, observes Mr. Yarrell, "the respiratory organs occupy more space in the males than in the females; and, on the other hand, the abdomen is larger in the females than in the males; the males may therefore be known from the females by their somewhat sharper or more pointed head, the greater length of the gill-cover, and the body from the dorsal fin downward being not so deep compared with the whole length of the fish."

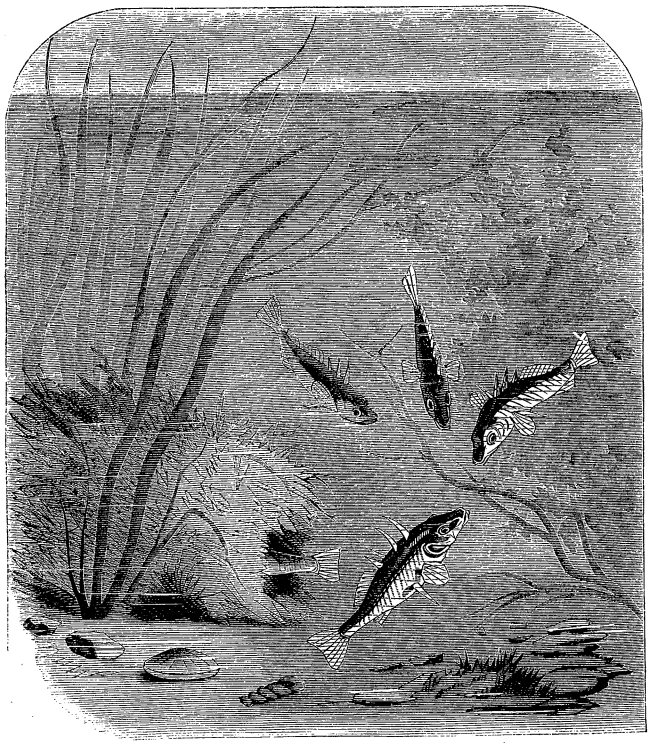
The reproductive organs of fishes are in the generality of the species of a more simple nature than is observed in the higher orders of the Vertebrata, consisting, toward the season of producing their young, of two elongated oval lobes of *roe*, one on each side of the body, placed between the ribs and the intestinal canal; the lobes in the female, called *hard roe*, contain a very large number of roundish grains, called ova or eggs, which are inclosed in a delicate membraneous tunic or bag, reaching to the side of the anal aperture, where an elongated fissure permits egress at the proper time. In the males the lobes of roe are smaller than in the females, and have the appearance of two elongated masses of fat, which are called *soft roe* or *milt;* they remain firm, however, till the actual season of spawning, when they become by degrees more and more fluid, and the whole is ultimately voided by small portions at a time, under slight abdominal pressure. The artificial breeding of fishes, now extensively practiced in Europe and America, is founded upon

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this economy of the nature of these animals, the eggs of the female being taken to any desired locality and placed in the water, and strown with the milt of the males.

At the season for depositing the spawn, which varies with almost every genus, some species repair to the gravelly shallows of rivers, and others to the sandy bays of the sea. This movement is called by fishermen "*going to hill*," or "*roading*;" other species resort to bunches of weeds. The object of that remarkable instinct in fishes which induces many species, as the herrings, pilchards, mackerel, &c., to perform long migrations, is doubtless to secure proper places in which to deposit their spawn. The shad thus ascends our rivers in the spring, and the salmon in like manner not only passes up the streams, but often, with an astonishing perseverance and vigor, shoots up cascades and waterfalls which might be supposed to present insuperable obstacles.

In many instances, when ready to deposit her spawn, a female is accompanied by two males, one on each side—a provision of nature which seems intended to secure the impregnation of the largest quantity of ova; and beside, the range of the influence of the male fluid is enormously increased by diffusion in water. The adhesive nature of the surface of each egg supplies the means of attachment to any of the various substances near which it may happen to be left; the time required for the appearance of the young fish is very variable, depending upon the species, and the season and its temperature. The young fish is first apparent as a line wound round the central vitelline portion of the egg, and ultimately escapes by rupturing the external capsule with its tail. The spawning appears to take place only once a year. Many fishes, however, are what is called ovo-viviparous; that is to say, the ova are retained within the oviduct until the complete evolution of the embryo. The mode in which the impregnation of the ova is effected in these cases is not exactly known. Fishes appear always to select shallow water for the deposition of their ova; but beyond this they do not generally exhibit any care for their offspring. A few, however, form a sort of nest for the protection of their eggs and young; and in some instances, the male remains as a guard over the fry until they have acquired sufficient strength and agility to venture forth into the world. The little sticklebacks, common in ponds, furnish an interesting example of the exercise of this instinct. Similar instances of care for the place where the ova are deposited are furnished by the European river bull-head and the lump-sucker. Instances of attachment between the parent fishes are also known among a few species.



NEST OF STICKLEBACKS.

The number of fishes in the various waters of the earth surpasses all human conception. Every pond, stream, river, and lake, as well as the ocean, covering three-fourths of the surface of our globe, swarms with these creatures. Such are the provisions of nature to maintain and multiply fishes, that streams which are dried up during the hot season are soon after supplied with abundance of these creatures, owing, no doubt, to the hatching of eggs which have been deposited in

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the sand, and are vivified when the water returns. Excluding the infusoria, fishes are of every size, from the shark to the minnow. Some of them move in shoals, which stretch out for miles, and surpass in numbers all human calculation. Not even the myriad insects of the earth and the air, upon the grasses, amid the flowers, on the leaves of the forests, at all approach in numbers the varied inhabitants of the sea. Every part of their element is occupied, some habitually living on the surface, some in middle-water, and some on the bottom, a hundred fathoms deep, these kinds being technically called *Surface*, *Mid-water*, and *Ground-Swimmers*. We have no measures, no examples, upon the land, of such teeming animal life as is found in the sea. Shoals of fishes are often met with, so crowding the waters as to cause obstruction to boats. Eight millions of pilchards have been drawn ashore at a single draught!* Who will attempt to calculate the numbers of these creatures, living story above story for five hundred feet, and extending over a surface of one hundred and fifty millions of square miles? There are species suited to every temperature: the golden carp thrives at 80° of Farenheit; some species exist in hot springs at 120°, and Humboldt saw fishes thrown up alive and in apparent health from volcanos along with water and vapor, at 210°—two degrees only below the boiling point! On the other hand, perch and eels are often transported in a frozen state, and on being thawed, are instantly restored to life and activity. A gold-fish, frozen solid in a marble basin, and appearing crystalized with ice, if gently thawed out, resumes his pleasures and duties as if nothing had happened.

Fishes not only afford the chief resource for food to innumerable species of birds, and even of quadrupeds, but they are of vital importance to man. In his savage state they often become his principal means of subsistence, and to civilized society the fisheries rise to the importance of national interests, protected by fleets, regulated by legislation, and made the subject of solemn international compacts. Fishes contribute not only to the solid necessities of man, but even to his luxuries and his amusements. They have their place in religion, and reconcile the members of "The Church" to its Friday's fasts and the long penance of Lent. On the other side of the water, the epicure gloats over his turbot, his sole, and his John Doree, and on this, over the sheep's-head, the tautog, and the attihawmeg. Fishes have their literature: Izaak Walton is as much a classic as Will Shakspeare, and Frank Forester as Ben Franklin. Despite Dr. Johnson's definition of an angler, "a pole and line, with a fool at one end and a worm at the other," there are tens of thousands who find a calm delight in strolling with hook and line, along the nooks and crannies of the sea, or the winding, singing, and sauntering brooks of the land; nay, the pensive fisher may often be moved to ecstasy when his skill is called into exercise by some crafty trout or dashing salmon. The professed sea-fisher of our country, who sets his sharp canvas in the teeth of the gale, and stretches away for the cloudy and tempestuous regions of the Grand Banks, or hugs more closely the capes of Cod and Montaug, casting his line into the inky waters, and drawing thence, as providence may decree, cod, haddock, and halibut—as well as the race of fishermen upon the coasts of England, Scotland, and Ireland, and still further north along the borders of Denmark and Norway—looking like amphibia, and braving the storm and the

* The following table, made from very careful calculations, shows the relative fertility of several species of oviparous fishes, and also the amazing fecundity of them all:

Fish.	Weight.		Weight roe.	No. of Eggs.	Date.
	oz.	drs.	grs.		
Carp	25	5	2.571	263,109	April 4.
Codfish	0	0	12.540	3,686,760	Dec. 23.
Flounder	24	4	2.200	1,357,400	March 14.
Herring	5	10	.480	36,860	Oct. 25.
Mackerel	18	0	1.223	545,631	June 18.
Perch	8	9	.765	28,323	April 5.
Pike	56	4	5.100	49,304	" 25.
Roach	10	6½	.361	81,586	May 2.
Smelt	2	0	.149	33,278	March 21.
Sole	14	8	5.422	100,362	June 13.
Tench	40	0	——	389,252	May 28.

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tempest, and with their dredges and trawling-nets raking the rough bottoms of those rocky coasts, and drawing thence turbot, sole, bleak, ray, ling, and a multitude of other uncouth but still coveted monsters of the deep—these all follow a profession which not only affords support to the body, but feeds rude spirits with a fierce delight.

The importance of fishes as a source of national wealth, renders their geographical distribution a matter of interest and importance. This seems to be determined by nearly the same laws as those which regulate that of other aquatic animals. Climate, composition of the element in which they live—whether salt, brackish, or fresh—and conformation of the sea or river-bed, on which the depth of water depends, are the chief controlling influences. The leading distinctions of form and color between fishes of tropical and those of temperate regions, evince the influence of climate; the fact of the fisheries for certain species commonly used for food being invariably conducted in deep water, while others can only be maintained among shallows, shows the influence of depth; the fact pointed out by Sir John Richardson that the seas, marked by ranges of land or reefs extending for great distances under the same climatic parallel, are peopled by the same species of fishes, is an instance of the action of the combined influences of climate and depth. The distinctness as to genera and species of the greater number of river and lake fish from those inhabiting the sea, depends on the second of the three great influences enumerated—that of the composition of the element in which they live. Great depths cut off the range of species even when climatic conditions are similar. Hence the fishes of the coast of the United States are for the most part distinct from those on the European side of the Atlantic. Some fishes have very limited ranges in depth compared with others, and, generally speaking, it may be assumed that those having the greatest vertical range—that is, range in depth—have also the widest horizontal extension, a fact depending on the capacity of such species for living under a greater variety of conditions. Barriers of land, as chains of mountains, determining the courses of rivers, are often the boundaries between two distinct specific assemblages of fresh-water fish, and in like manner a very narrow strip of land may divide two very distinct marine faunas. The distribution of marine vegetables, affecting the distribution of numerous marine *Invertebrata* which feed on those vegetables, and in their turn serve to furnish food for fishes, will materially affect the distribution of many species of the latter. So also will the presence of currents, and even the agency of man, assisting often unintentionally in the conveyance of ova from one country to another. Distant regions, presenting similar conditions, such as the arctic and antarctic seas, are inhabited by species representative yet not identical, and presenting a general aspect very similar, depending on characters of form and color, &c. It is probable also that the fishes inhabiting the greater depths of tropical seas resemble those of temperate climes, and that those of the latter in like manner approach arctic forms.

Considering the immense number of fishes, and the almost endless diversity of their forms and their characteristics, it is not surprising that they should present great difficulties in their classification. The arrangement of Cuvier, which we have given in outline in the Introduction to this work, was the leading one for a time, but it has been modified by more recent naturalists. As we can only give a very brief description of prominent species, we shall notice them under five orders, as follows: the *Selachia*, the *Ganoidea*, the *Teleostea*, the *Cyclostomata*, and the *Leptocardia*.

ORDER 1. **SELACHIA.**

This order derives its name from the Greek *selachos*, a shark, and includes the *Sharks* and *Rays*, and corresponds with the typical species of Cuvier's *Chondropterygious* fishes. The skeleton is entirely of a cartilaginous nature; the teeth variable, being in the Sharks, which are the most active and predacious members of the order, exceedingly sharp, compressed, and occasionally serrated at the edge; in the Rays they sometimes exhibit the same trenchant character; in other cases they are arranged in mosaic, and in still others the teeth form broad pavement-like plates. They are never inserted into the jaws, but are retained in their position by the strong skin of the gums. The fins are variously disposed; the skin is sometimes quite naked,

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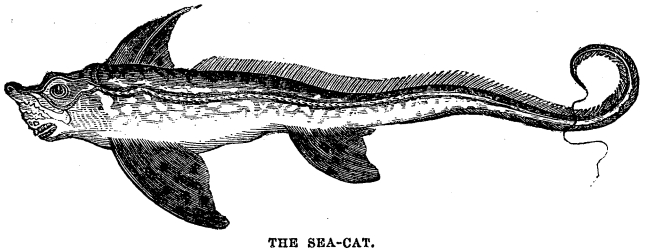


THE SHARK.

and sometimes marked with scattered spines or minute grains over the whole body. The branchiæ are distinguished from those of other fishes by their structure, being arranged so as to allow the water used in respiration to pass off through separate external apertures. Most of the species produce living young, which are developed in an enlarged portion of the oviduct. All are generally of large size, and are inhabitants of the sea, though several species frequent the estuaries formed by large rivers. We shall notice them under the heads of *Chimæridæ*, *Squalidæ*, and *Raiidæ*.

THE CHIMÆRIDÆ.

Genus CHIMÆRA: *Chimæra.*—These animals have some resemblance to the sturgeons; they have two dorsal fins, the anterior one being situated over the two powerful pectoral fins; the anal fin is long and narrow, and the tail heterocercal. The best known species is the Northern Chimæra or Sea-Cat, *C. monstrosa*, sometimes called *King of the Herrings*. It is three to four feet long, of a silvery color, spotted with brown; feeds on herrings, the shoals of which it follows, and also on other fish, medusæ, and crustacea. It is found in the European seas, and occasionally on the British coast.



THE SEA-CAT.

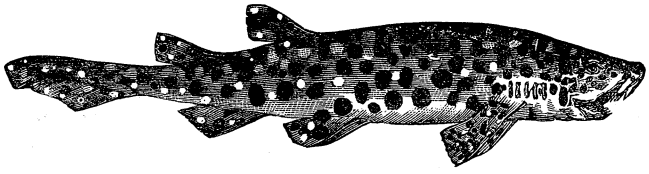
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Its flesh is indifferent food. A species resembling this, found in the south seas, is the *Callorhynchus Australis.*

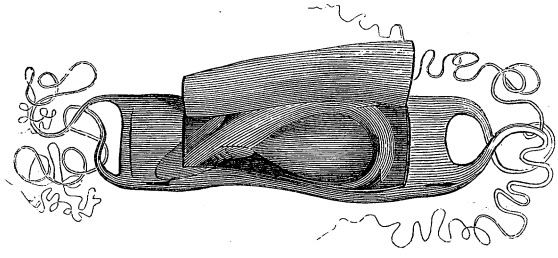
THE SQUALIDÆ OR SHARKS.

These are at once distinguished by their elongated, spindle-shaped bodies, their branchial apertures placed on the sides of the neck, and their pectoral fins of the ordinary form and position. The symmetrical tail is large and fleshy, furnished with powerful fins, which render it a most efficient agent in progression; the nose is usually conical and pointed, the mouth large, and armed with most formidable cutting teeth, and the upper surface of the head is frequently furnished with a pair of spiracles, although these apertures are often wanting. This group, in which the female is generally the largest, includes several families; we can only notice the prominent species.

Genus SCYLLIUM: *Scyllium.*—This includes nearly a dozen species, generally called *Dog-Fishes.* While most other sharks bring forth their young alive, these are remarkable for producing eggs in horny cases, the shape of which is represented in the annexed engraving. These are deposited by the female shark near the shore; the convoluted tendrils at each end hang to the sea-weed and prevent the eggs from being washed into deep water. The young fish ultimately escapes by an opening at the end where the head is situated. The cases of these eggs are popularly called *Mermaid's Purses, Sea-Purses, Sailor's Purses,* &c., and are of a pale yellowish, horny color.



THE LARGE SPOTTED DOG-FISH.



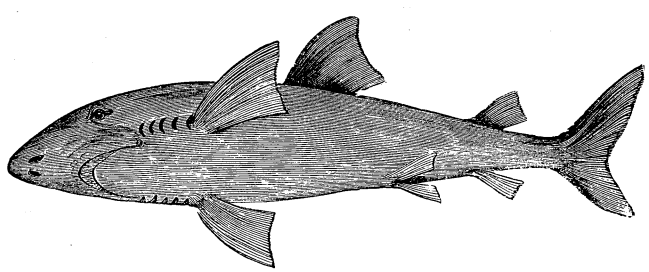
SHARK'S EGG LAID OPEN TO SHOW THE POSITION OF THE YOUNG FISH.

The Large Spotted Dog-Fish, *S. catulus*—often called *Bounce* and *Rock Dog-Fish* in England—the *Squale Panthère* of the French, is two to three feet long, haunts deep water, and feeds on small fish and crustacea. Found on the British coasts.

The Small Spotted Dog-Fish, *S. canicula*—called *Morgay* in Scotland—is about two feet long, of a slender form; common on the British shores; lives in deep water, and feeds voraciously on fish and crustacea; takes the bait freely, and is troublesome and injurious to the fisheries on account of its numbers and voracity.

The Black-mouthed Dog-Fish, *S. melanostomum,* is two to three feet long, and is found in European seas; common in the Mediterranean.

Genus CARCHARIAS: *Carcharias.*—This includes about twenty species of true sharks, several of which are large and formidable. The White Shark, *C. vulgaris,* has the body elongated, swims with great ease, measures from fifteen to twenty feet, is exceedingly voracious, and has been known to swallow the entire body of a man. It often follows ships for days, feeding on the offal that is thrown overboard. It is occasionally caught by the sailors, who have a mortal dread of it. In the stomach of these creatures a curious assortment of articles is sometimes discovered; in one case the contents of a lady's work-basket, even including the scissors,

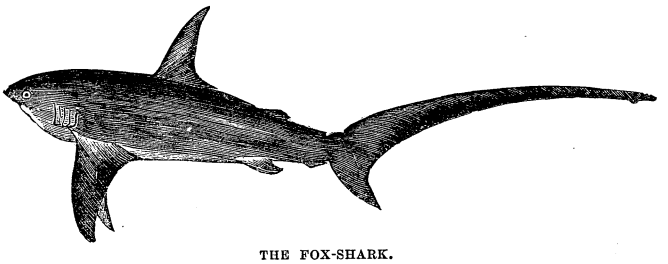


THE WHITE SHARK.

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were found, and in another an entire bull's hide. Upon the latter a sailor remarked that the fish had swallowed a bull, but could not digest the hide! This species is common throughout the Atlantic, especially the tropical portions of it, and is the scourge of the Mediterranean.

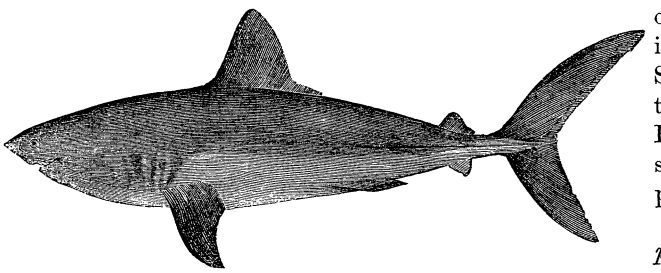
The Fox-Shark or Thresher, *C. vulpes*, is twelve to eighteen feet long, the tail nearly as long as the body; it uses this member for attacking other animals by its powerful strokes. It is said even to attack the whale in this manner. It pursues shoals of mackerel, mossbunkers, and shad, and devours them in great numbers. It is common on both sides of the Atlantic.



THE FOX-SHARK.

Other species are the Blue Shark, *C. ceruleus*, noted for its affection for its young; four to six feet long: the Dusky Shark, *C. obscurus*, and the Ground Shark, *C. littoralis*, five to eight feet long; all found on both sides of the Atlantic.

Genus LAMNA: *Lamna.*—To this belongs the Porbeagle, *L. Cornubica*, six feet long, and deriving its name from a resemblance of form to the porpoise. Common in European seas. The Beaumaris Shark, *L. Monensis*, is seven to ten feet long, and found on the British coasts. It is considered by some as only a variety of the preceding.

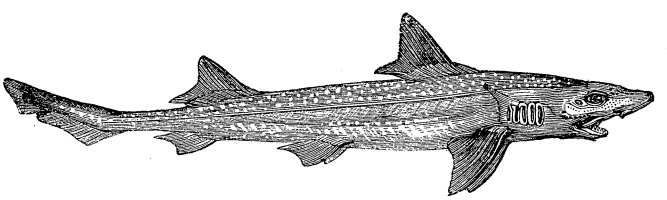


THE PORBEAGLE.

The Mackerel Porbeagle, *L. punctata*, is six to ten feet long, and is often called *Mackerel Shark*, from its habit of pursuing shoals of mackerel. It produces a kind of oil much valued by curriers; found along the coasts of New York, and more abundantly on those of Massachusetts. The Long-tailed Porbeagle, *L. caudata*, three to eight feet long, and is found on the coast of Long Island.

Genus GALEUS: *Galeus.*—This includes the Penny Dog, *G. vulgaris*, called *Tope* and *Miller's Dog* in England, six feet long, voracious and destructive; it yields a valuable oil; is abundant on the coast of England in summer.

Genus MUSTELUS: *Mustelus.*—To this belongs the Smooth Hound, *M. lævis*, noted for the smoothness of its skin; sometimes called *Ray-mouthed Dog;* two to three feet long; takes bait, but is less rapacious than other species; common on the British coasts.



THE SMOOTH HOUND.

The American Hound-Fish, *M. canis*, called *Dog-Fish* by our fishermen, is two to four feet long, feeds on crustacea and sea-weed, and is found on the shores of Long Island.

Genus SELACHUS: *Selachus.*—To this belongs the Basking Shark, *S. maximus*, twenty to thirty-two feet in length; one of the largest of the shark family; it derives its name from a habit of basking lazily in the sun; in England it is sometimes called *Sun-Fish* and *Sail-Fish.* It is often seen gliding along with its dorsal fin and upper jaw out of water, and has occasionally been taken for the sea-serpent. It is not voracious or dangerous. Found in the northern seas on both sides of the Atlantic.

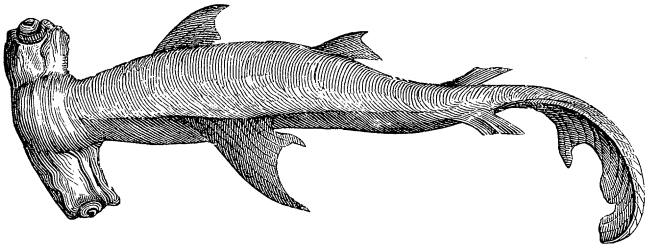
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Genus SPINAX: *Spinax.*—This includes the PICKED DOG-FISH, *S. acanthias*, one to three feet long; as it is exceedingly voracious, and the species numerous, it is one of the principal scavengers of the seas. It is called *Spinous Dog-Fish* by De Kay. Found on both sides of the Atlantic.

Genus SCYMNUS: *Scymnus.*—To this belongs the GREENLAND SHARK, *S. borealis*, fifteen to twenty feet long, six to eight feet in circumference; the mouth large, the color ashy-gray. It is a great enemy to the whale, biting lumps as big as a man's head out of its body even while living. It gorges itself upon such whales as it finds dead; it does not appear to attack mankind. Its heart is small, beats about six times in a minute, and pulsates for some hours after being taken out of the body. It is unsafe to put the hand into its mouth, even after the head is severed from the trunk. Its insensibility to pain is such that a knife may be run through its body and the animal will still go on gorging itself with food. Besides the flesh of whales, it devours various kinds of fish. It is infested with parasitic insects—a species of *Lernæa*—some of which are three inches long. It is found in the North Atlantic.

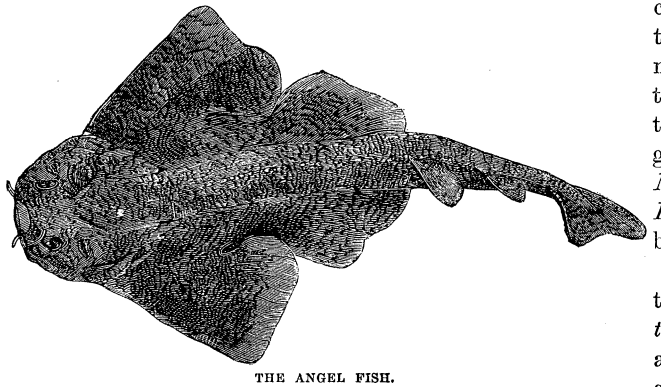
THE NURSE, *S. brevipinna*, is six to seven feet long, and sometimes called *Sleeper*, from its sluggish habits. Found on the coasts of Massachusetts.

Genus ZYGÆNA: *Zygæna.*—To this belongs the HAMMER-HEAD SHARK, *Z. malleus*, having a body like other sharks, but with a double snout like a double-headed hammer, and having an eye in the middle of each extremity; it is very voracious, and from twelve to twenty-five feet long. One of them taken on the coast of Long Island had parts of the body of a man and his clothing, in his stomach. This species is found on both sides of the Atlantic.



HAMMER-HEAD SHARK.

Genus SQUATINA: *Squatina.*—To this belongs the ANGEL FISH, *S. angelus*, which seems to partake of the nature of both sharks and rays. Notwithstanding its name it is a hideous-looking creature, with two enormous pectoral fins, said to have given it its name, from a fancied resemblance to the wings of angels. It is three to four feet long, and in Europe goes under the various titles of *Monk-Fish*, *Monkey-Fish*, *Shark-Ray*, and *Fiddle-Fish*. Found on both sides of the Atlantic.



THE ANGEL FISH.

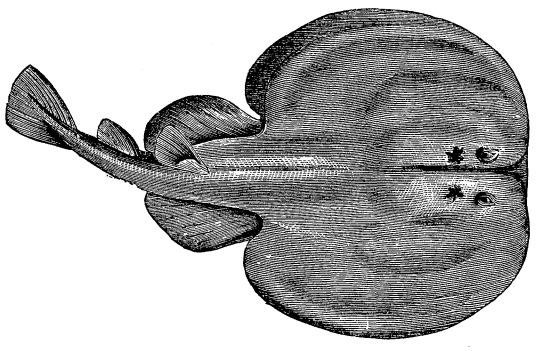
Genus PRISTIS: *Pristis.*—To this belongs the SAW-FISH, *P. antiquorum*, fifteen feet long, having a body like the shark, but the snout being extended like the blade of a sword, with strong and trenchant teeth on both sides. This powerful weapon is sometimes five or six feet long, and with it these fishes often attack whales and inflict dreadful wounds.

THE RAIIDÆ.

These animals are of a flat or depressed figure, the great breadth of the body being produced by the singular expansion of the pectoral fins. There is no distinct head; the tail is long and slender, and furnished with two dorsal or upper fins, and sometimes with the vestige of a caudal fin. The mouth and branchial orifices are on the under surface. The texture of the skin varies;

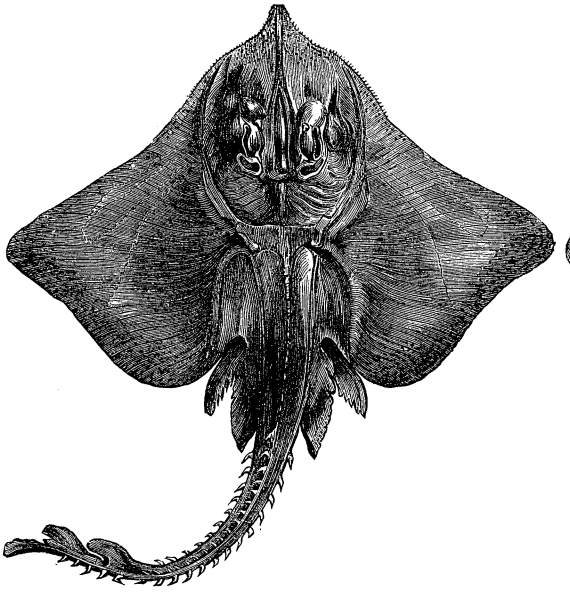
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in some it is rasp-like, in others studded with tubercles or spines, with which latter the tail is always armed. These fishes, some of which attain to enormous dimensions, are admirably adapted by their form for existing at the bottom of the water on beds of sand or mud. When disturbed they slide along in an undulatory manner, and with a slight motion of the pectoral fins. They defend themselves by lashing violently with the tail. They are very voracious, feeding on fishes and crustacea, and upon shelled or naked mollusks. Their teeth are flattened and lozenge-shaped, forming a serried phalanx of points directed backward. So powerful are the jaws that they are capable of crushing the shell of a crab with the greatest ease. The females exceed the males in size, as in the sharks: their eggs are corneous, and closely resemble those of the dog-fish. There are many species distributed over nearly all seas.

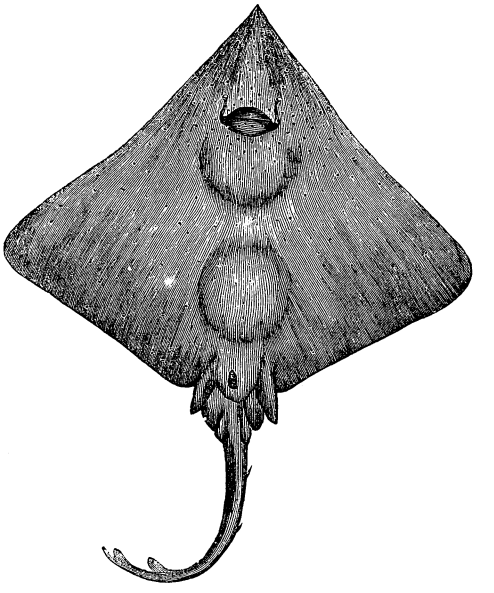


THE ELECTRIC RAY.

Genus TORPEDO: *Torpedo.*—To this belongs the ELECTRIC RAY, *T. vulgaris*, called *Cramp-Fish* in England; it is of considerable size, weighing from one to two hundred pounds. It is remarkable for an electrical battery situated between the pectorals and head and gills; this is indicated by two elevations extending along the back, and consists of numerous cells formed like honeycomb, this being, as is the similar provision of the *Gymnotus* or Electric Eel, amply supplied with nerves. On being touched the animal imparts a severe electric shock, sufficient to stun its prey. It is found in the European waters, and probably also on this side of the Atlantic. There are about twenty species of this curious family in different parts of the world, and all supposed to possess electrical powers. It is said that one species is found on our coasts.



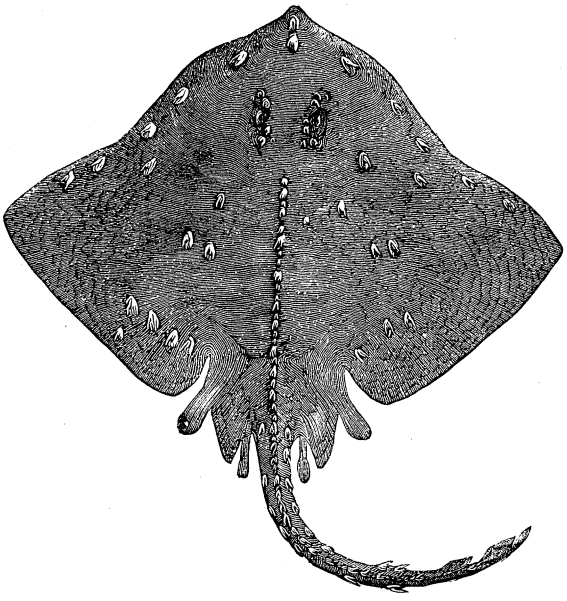
THE BORDERED RAY.



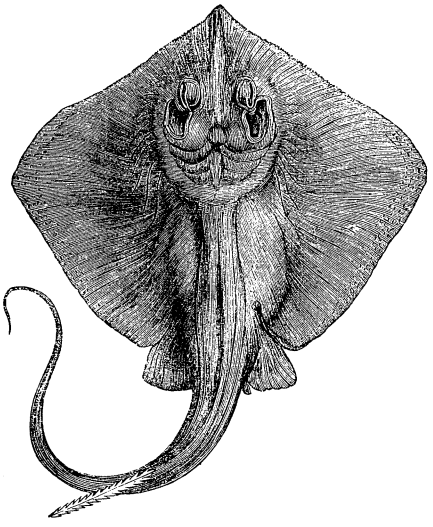
THE SKATE.

Genus RAIA: *Raia.*—This incudes the *True Rays*, of which there are several species which feed on fishes, mollusca, and crustacea. The BORDERED RAY, *R. marginata*, is two to three feet long, including the tail. The flesh is tolerably good; common on European coasts. Other species are the HOMELYN or SPOTTED RAY, *R. maculata;* SMALL-EYED RAY, *R. microcellata;*

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THE THORNBACK.



THE STING RAY.

STARRY RAY, *R. radiata;* the SHARP-NOSED RAY, *R. oxyrhynchus;* the SHAGREEN RAY, *R. chagrinea;* all found in the European waters.

The THORNBACK, *R. clavata*, is noted for the excellent quality of its flesh, and is common on the European coasts. The prevailing color of the upper part, which is rough with small points, is dark brown, the under part white, as is the case with most species of Ray. It is two to three feet long.

The SKATE, *R. batis*, is often called *True Skate*, to distinguish it from the Thornback and Homelyn, which are also called skate; is not so common as these, but is superior to either for the table; color above grayish brown; under surface sooty white. The females of this as well some other Rays are called *Maid* in England. It is very voracious, and grows to a large size. Found in the European and American waters.

There are several species of Ray found on our American coasts. The SMOOTH SKATE, *R. lævis*, five to six feet long, perhaps the same as *R. batis* of Europe, is caught on our coasts and sold in our markets. The CLEAR-NOSED RAY, *R. diaphanes*, is two to three feet long, and is caught together with codfish. Its flesh is not much esteemed, but is eaten by some persons; common in our markets in March. The PRICKLY RAY, *R. Americana*, is two to three feet long, and resembles the *R. batis* already described. The SPOTTED or OCELLATED RAY, *R. ocellata*, grows to the length of two or three feet; it is common on our coasts, and is often caught with the hook. The HEDGE-HOG RAY, *R. erinaceus*, is two to three feet long, and found on the coast of New Jersey.

Genus PASTINACA: *Pastinaca.*—This includes the WHIP STING RAY, *P. hastata;* has a long tail, armed with two or more spines. Found on our coasts. The BROAD STING RAY, *P. maclura*, is six to eight feet long, and ten to fifteen feet wide, with one or two spines on the tail, near the base. Found on the coast of Rhode Island.

Genus TRYGON: *Trygon.*—This includes the STING RAY, *T. pastinaca*, which is found on sandy ground in shallow water and not far from the land. Its tail is armed with a sharp spine five inches long, serrated on both edges, with which it lacerates its enemies. Its flesh is rank and disagreeable; widely distributed in the European seas. There are several other species.

Genus MYLIOBATIS: *Myliobatis.*—This includes the WHIP RAY, *M. aquila*, the *Aigle de Mer* of Cuvier. It derives its name from its long, slender, flexible tail; and is called *Eagle Ray* from

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the wing-like form of the pectoral fins. It is three to five feet long; has a sting measuring three or four inches, and is found in the European seas; common in the Mediterranean.

Genus CEPHALOPTERA: *Cephaloptera.*—To this belongs the SEA DEVIL, or OCEAN VAMPIRE, *C. vampirus*, sixteen to eighteen feet long, and eighteen feet wide, and occasionally weighs three or four tons. It seizes the cables of small vessels, and sometimes drags them along with great swiftness for several miles. Found on our southern coasts.

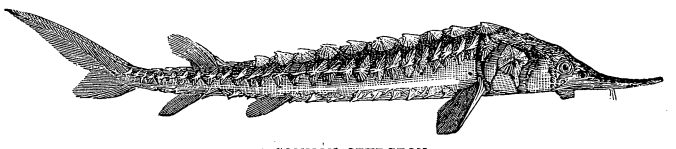
ORDER 2. **GANOIDEA.**

The term *Ganoidea* is derived from the Greek *ganos*, splendor, and was applied by Agassiz to a large number of fishes, mostly fossil, distinguished by the angular form of the scales, these being composed of corneous or osseous substances, disposed one upon the other, and covered by a thick coat of enamel, and consequently resembling teeth. As a system more convenient for our purpose we adopt the classification of Müller, applied to the living groups and divided into the *Chondrostea*, having a cartilaginous skeleton, and the *Holostea*, having a bony skeleton.

THE CHONDROSTEA.

Of these there are many fossil species, but of the living there are only two families, the *Acipenseridæ* and the *Spatularidæ*.

Genus ACIPENSER: *Acipenser*, includes several species of *Sturgeon;* these have an elongated body, and a funnel-shaped and protrusible mouth, without teeth, placed on the under side of the head.



THE COMMON STURGEON.

The COMMON STURGEON of EUROPE, *A. sturio*, is from six to twelve feet long; one weighing four hundred pounds is mentioned by Pennant. It is found in the European seas and rivers, especially in the north; its flesh is delicate and is compared to veal. Henry I., of England, declared it to be a royal fish and forbade it to be eaten at any table but his own.

The BELUGA, *A. huso*, attains the length of fifteen feet, and weighs from one to three thousand pounds. Its flesh is not greatly esteemed, but from its air-bladder an abundant supply of isinglass is obtained, in the Russian rivers, and also in the Caspian and Black Seas, where this fish is common. Other species, taken in large numbers in these regions, are the STERLET, *A. ruthenus*, and the SCHERG, *A. helops*. From the female roe of all these species of sturgeons, a substance called *caviare* is obtained, forming an important article of commerce in the countries around the Mediterranean. As a hundred thousand of the beluga alone are said to be annually taken in the Russian rivers, and as the roe constitutes often one-third of the whole weight of this fish, the extent of this trade may be easily calculated.

The SHORT-NOSED STURGEON, *A. brevirostris*, found occasionally in the Hudson and other American rivers, resembles the European sturgeon, and may possibly be of the same species.

The LAKE STURGEON, *A. rubicundus*, four to six feet long, is found in lakes Ontario and Erie, and in the Ohio River.

The SHARP-NOSED STURGEON, *A. oxyrhynchus*, is seven to eight feet long, and is found in the American Atlantic rivers. Other species are found in the northern and northwestern rivers of North America.

Genus SPATULARIA: *Spatularia*, includes certain species found in the great rivers of North America, of which the PADDLE-FISH, *S. folium*, of the Mississippi, is the type. In these the skin is naked and the nose prolonged into a thin leaf-like appendage, sometimes nearly as long as the body.

THE HOLOSTEA.

This group includes several families most of which are fossil: of the *Amiidæ*, which are clothed with small horny scales, usually covered with a layer of enamel, the *Amia marmorata* is the best

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known species. It inhabits the rivers of the warm parts of America, and feeds on crustacea. It is of small size, and is of little value for food.

Another family is that of the *Polypteridæ;* one species, the *Polypterus bichir*, haunts the muddy bottom of the Nile; it is eighteen inches long, and has sixteen dorsal fins. It is esteemed an excellent fish. Another species, *P. Senegalus*, found in the Senegal, has twelve dorsal fins.

Of the *Lepidosteidæ*, the only existing family is that of the *Bony Pikes*, found in the rivers and lakes of the United States. They are of a long pike-like form, the jaws produced into a long narrow snout, presenting a resemblance to that of the gavial. Their flesh is generally good.

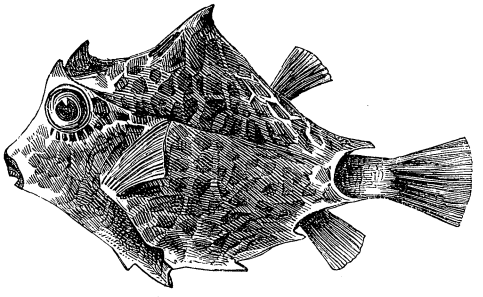
Genus LEPIDOSTEUS: *Lepidosteus*, includes the Buffalo Ray-Pike, *L. bison*, two to three feet long; found in Lake Erie and other lakes in that region. The Flat-nosed Ray-Fish, *L. platyrhynchus*, is about two feet long, and is found in Florida. There are several other species.

ORDER 3. **TELEOSTEA.**

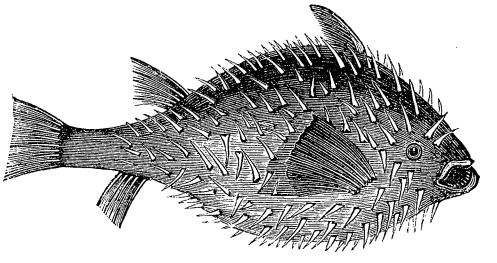
This extensive and important order derives its name from two Greek words, *teleos*, complete, and *osteon*, bone, and corresponds nearly with Cuvier's great section of *Osseous Fishes*. The skull is always of a very complicated structure, and composed of numerous bones; the gills are supported upon free bony arches, and the water passes away from them by a single opening, protected by a bony operculum or gill-cover. The mouth is always formed by a pair of regular jaws, and usually armed with teeth. Many are covered with naked skins, but the majority have horny scales of various forms. We shall notice them under six divisions, as follows: the *Plectognatha*, *Lophobranchia*, *Acanthoptera*, *Pharyngognatha*, *Anacanthina*, and *Physostomata*.

THE PLECTOGNATHA.

This term is compounded of two Greek words, *plektos*, united, and *gnathos*, a jaw, and alludes to the principal characteristic of the group, the firm attachment of the bones of the upper jaw and palate to the cranium. The division includes many species, some of which are of very extraordinary appearance. Among them are the *Trunk-Fishes*, of which there are several species, covered with an inflexible bony armor.



THE TRUNK-FISH.



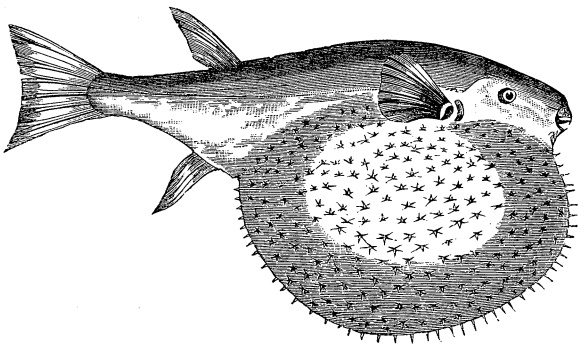
THE SEA-PORCUPINE.

The Dromedary Trunk-Fish, *Lactophrys camelinus*, three and a half inches long, and Yale's Trunk-Fish, *L. Yalei*, fourteen inches long, are found on our coasts. The Six-horned Trunk-Fish, *Ostracion sex-cornutus*, is found in the Gulf of Mexico.

To this group also belong the *Balistes*, of which there are several species, having a thick, leathery skin, often beset with spines. They chiefly inhabit warm climates, but one species, the Dusky Balistes, *B. fuliginosus*, twelve inches long, is found on our coast. There are also several species of this family, belonging to the genus *Monocanthus*, and called *File-Fishes*, common in our seas. They are of various sizes, from four inches to two feet. One of them, the Long-finned File-Fish, *M. broccus*, eight inches long, is called the *Fool-Fish*, on account of its absurd manner of swimming, with a wriggling motion, its body being sunk and its mouth on a level with the surface of the water. It is common in New York harbor, and is often taken in nets set for other fishes.

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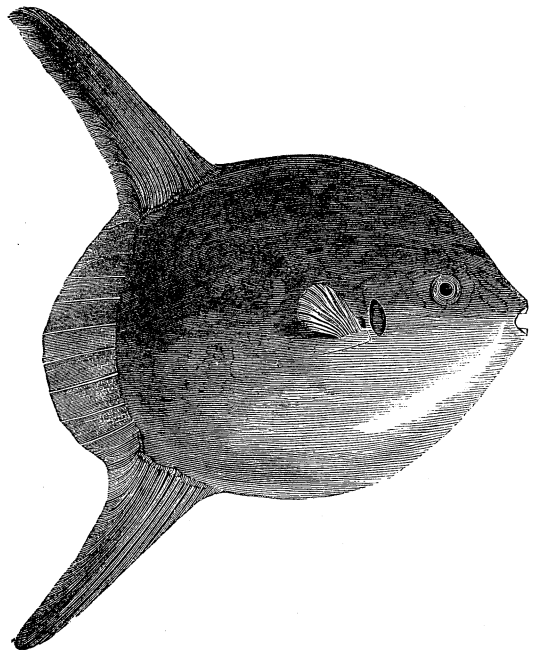
The fishes of the genera *Diodon* and *Tetraodon*, popularly called *Sea-Porcupines*, have a large air-bladder, which they inflate by swallowing air, till they appear almost like balls. They are also covered with spines which they erect at will. Several species of *Diodon*, called *Balloon-Fish*, are common in our waters. They are of very small size. Those of the genus *Tetraodon* are called *Puffers:* several species are met with in the American seas. The COMMON PUFFER, *T. turgidus*, which has the various designations of *Blower*, *Toad-Fish*, and *Swell-Fish*, is six to twelve inches long; is abundant on our shores, and is frequently taken by anglers seeking for tautog. When taken out of the water it will puff itself up like a distended bladder; the boys, in a spirit of cruel sport, sometimes throw a large stone upon it in this state, when it bursts with a loud explosion. Several other species are known along the American coast.



PENNANT'S GLOBE-FISH.

PENNANT'S GLOBE-FISH, *T. Pennantii*, is found in Europe; it occasionally happens that this, as well as other species, when they have puffed themselves up, lose their balance in the water, and float about, belly upward, in a most helpless condition. The sharp spines on their stomachs, however, protect them from their enemies. Pennant's Globe-fish is about eighteen inches long; a smaller kind, found in the Nile, *T. lineatus*, is said to have electrical properties, and occasionally being driven on shore, it dies and becomes dried, and is used for balls by the children A very small species of globe-fish is found on our coast.

The largest species of this family is that of the SUN-FISH or SHORT SUN-FISH, *Orthagoriscus mola*, which is almost of a circular form, with long dorsal and anal fins, projecting like handles from its hinder parts. It attains a great size, sometimes as much as four or five hundred pounds' weight, and measures four or five feet in length. It has a silvery appearance, and at night is highly phosphorescent, whence it is called *Sun-Fish*, and in some places *Moon-Fish*. Its flesh is not good, but it yields considerable oil. It is found on the coasts of Europe and America. It is here often called *Head-Fish*.



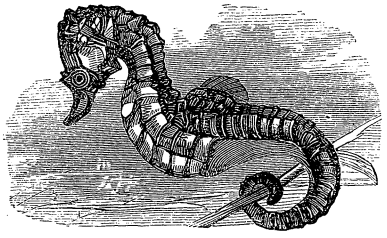
THE SHORT SUN-FISH.

THE LOPHOBRANCHIA.

To this division, so called on account of the tufted gills of the species, belongs a single family, of very curious formation, bearing the name of *Sea-Horse*, one species of which is found in Europe—the SHORT-NOSED SEA-HORSE, *Hippocampus brevirostris*. These animals have a head of the shape of a horse, and a long tail without any fin, but which is used by the fish to lay hold of sea-weed and other objects. They are common in the tropics, and are often brought home by sailors.

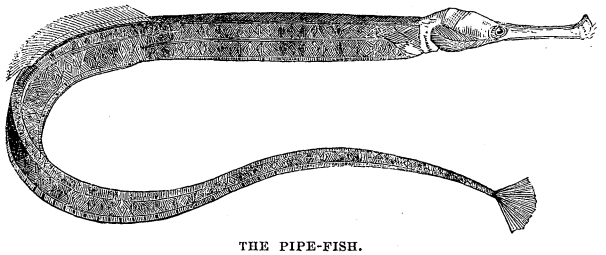
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They are usually of small size. Mr. Yarrell describes two specimens of the Short-nosed Sea-Horse taken in England; they were about five inches long, and being put into a glass vessel swam about, their heads in a vertical position, and their tails readily grasping the sea-weed put into the vase. When the two approached each other, they often twined their tails together. These little fishes are very amusing in an aquarium.



THE SEA-HORSE.

To the same family as the preceding belong the *Pipe-Fishes*, which have a long, eel-like body, with the jaws united and forming a tube nearly cylindrical. The eggs of the female are cast by her into a sort of false belly belonging to the male, and situated near the tail; here they are hatched, and here they occasionally take refuge like young opossums! So apt are they to take to this retreat, that if the parent be caught and the young fry be shaken out of the pouch, they will immediately return if the tail of the parent be held in the water. There are several species: the GREAT PIPE-FISH, *Syngnathus acus*, which is found on the European coasts, is twelve to eighteen inches long. It lives on water insects, worms, and small mollusca, and swims horizontally or perpendicularly, in every attitude of contortion.



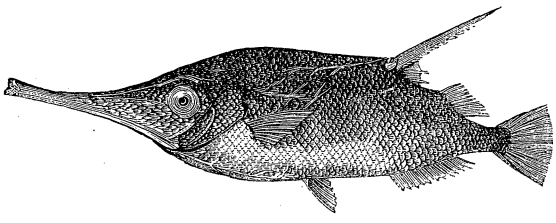
THE PIPE-FISH.

THE ACANTHOPTERA.

This sub-order includes those of the *Acanthopterygii* or *Spiny-finned Fishes* of Cuvier, which have the inferior pharyngeal bones distinctly separated. The rays of the first dorsal fin are always spinous, and the first rays of the other fins, excepting the caudal, are often of the same structure. The number of fishes belonging to this division is very great; we shall notice them under the following heads: *Aulostomidæ*, *Trigilidæ* or *Cataphracta*, *Percidæ*, *Sciænidæ*, *Sparidæ*, *Chætodontidæ*, *Teuthidæ*, *Scomberidæ*, *Xiphiidæ*, *Coryphænidæ*, *Notacanthidæ*, *Cepolidæ*, *Mugilidæ*, *Anabatidæ*, *Gobiidæ*, *Blenniidæ*, and *Lophiidæ*.

THE AULOSTOMIDÆ.

The fishes of this family, whose scientific name means *pipe-mouthed*, have the bones of the face drawn out into a long tube, at the extremity of which is the opening of the mouth; hence they are called *Sea-Snipes*, *Trumpet-Fishes*, *Bellows-Fishes*, &c. There are several species, mostly inhabitants of the seas of warm climates. The COMMON TRUMPET or BELLOWS-FISH, *Centriscus scolopax*, like the rest of the family, feeds on minute animals found among sea-weed; its flesh is good; length five inches and upward; common on the coasts of Europe. The TOBACCO-PIPE-FISH, *Fistularia serrata*, and NEW YORK TRUMPET-FISH, *F. tabacaria*, are American species.



THE TRUMPET-FISH.

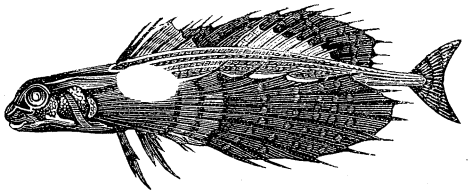
THE TRIGILIDÆ OR CATAPHRACTA.

These fishes are noted for having the cheeks covered with bony plates, and the head is usually more or less armed with spines, or furnished with membraneous appendages, which often give them a singular appearance. The fins are usually greatly developed.

Genus DACTYLOPTERA: *Dactyloptera*.—In the species of this genus, the pectoral fins attain such a length as to enable the fish to support itself in the air for a short time. There are

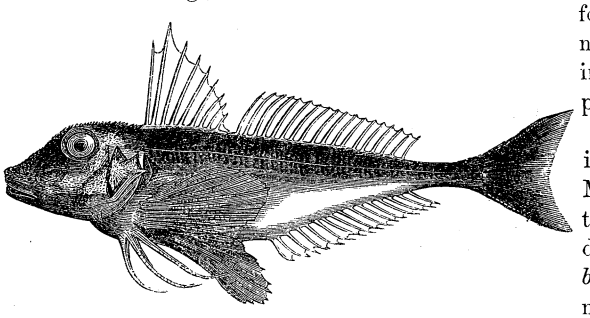
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two species: the Common Flying Gurnard or Sea-Swallow, *D. volitans*, is from six to fifteen inches long, and is found in the Mediterranean, and also in the European and American seas. The *D. orientalis* is found in the Indian seas. These are called *Flying-Fish*, and perform nearly the same feats in the air as the true flying-fish, belonging to the genus *Exocœtus*, which we shall hereafter describe.



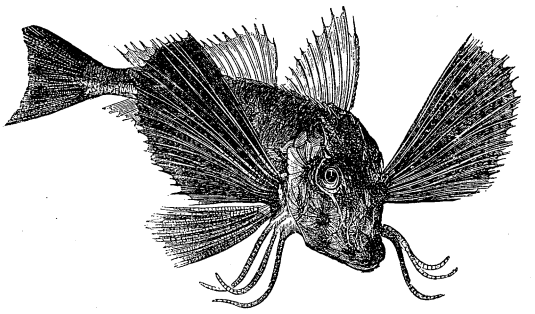
THE FLYING GURNARD.

Genus TRIGLA: *Trigla.*—To this belongs the Red or Cuckoo Gurnard, *T. cuculus*, twelve to sixteen inches long; it feeds on crustaceous animals; spawns in May or June; is esteemed for food; taken in deep water with a trawl-net; affords excellent amusement in fishing with hand-lines; common in European and American waters.



THE RED GURNARD.

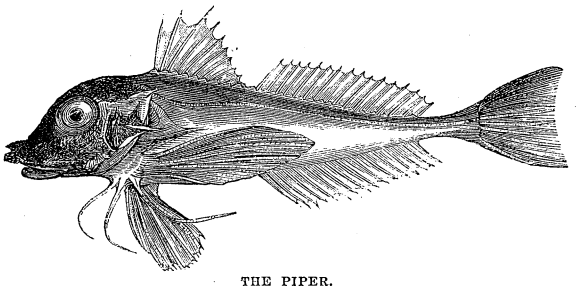
The Sapphirine Gurnard, *T. hirundo*, is two feet long, and is common in the Mediterranean and other European waters; its flesh is good, though rather dry; it is caught with long lines, called *bulters*. In England it has the popular name of *Tub-Fish* or *Red Tub*.



THE SAPPHIRINE GURNARD.

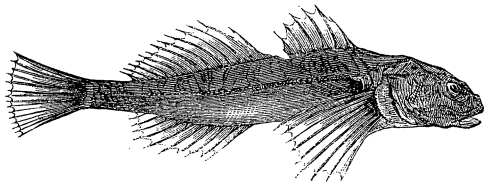
Other species of Gurnard are the Piper, *T. lyra:* Gray Gurnard, *T. gurnardus*, and Bloch's Gurnard, *T. Blochii:* all found in European waters: the Streaked or Banded Gurnard, *T. lineata—Prionotus lineatus* of De Kay—called *Sea-Robin*, *Grunter*, &c.; common in Europe and America.

There are two or three American species belonging to the genus *Prionotus*. Among them are the Web-fingered Gurnard, *P. Carolinus*, twelve to fourteen inches long; found from Nantucket to the Southern seas: also the Spinous Gurnard, *P. tribulus*, eight inches long; found from New York to Charleston, and probably exists in the intertropical seas. The *P. punctatus*, twelve inches long, is found in the waters of the Antilles.



THE PIPER.

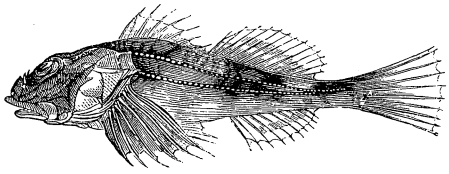
Genus COTTUS: *Cottus.*—This includes the River Bull-Head or Miller's Thumb, *C. gobio*, four or five inches long; hides in the water among loose stones; feeds on the larvæ of water-insects, and the ova and fry of fishes; is very voracious, and easily caught with a hook baited with red worm. It is eaten in Italy, and in Russia is deemed a charm against fever; it is also used as a weather-vane in the same country, it being thought that if suspended by a thread its head will point in the direction from which the wind will blow. Common in the European seas.



THE RIVER BULL-HEAD.

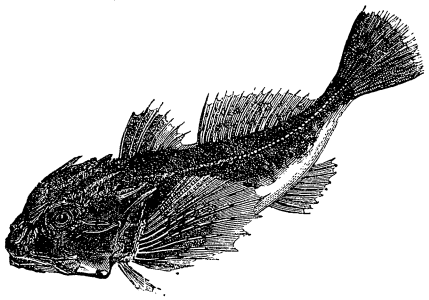
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The Sea-Scorpion or Short-spined Cottus, *C. scorpius*, is five to eight inches long; is very voracious, swims rapidly, and is found under stones and sea-weed along the European shores. They are often caught in trawl-nets, but are of no value; on account of their sharp spines they are carefully handled; common in European and American waters.



THE SEA-SCORPION.

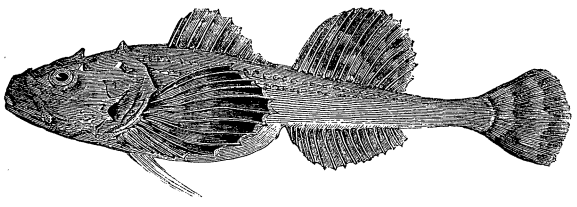
The Father Lasher, *C. bubalis*—called *Lucky Proach* in Scotland—is six to twelve inches long; feeds on small crustacea and young blennies; when touched it sets out its numerous spines, and assumes a most threatening appearance. Found in European waters, and is common on the British coasts. It will live a long time out of water, but taken from the sea and put into fresh water, it dies immediately. In Greenland it grows to a large size, and is much esteemed for soup.



THE FATHER LASHER.

The Four-horned Cottus, *C. quadricornis*, called also *Greenland Bull-Head* or *Greenland Sculpin*, is six to eight inches long, feeds on young gobies, which it catches by lying in ambush among stones or sea-weeds. It is chiefly used as bait for fishing; common in European and American seas.

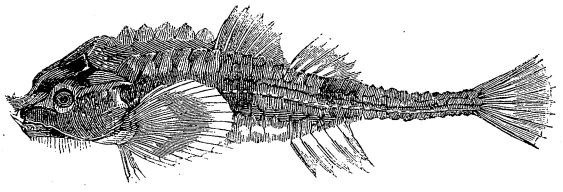
The Common Bull-Head, *C. Virginianus*, is regarded by fishermen with aversion, on account of its revolting appearance, but it is not a bad article of food; it is common on our coasts, and bears the popular names of *Sculpin*, *Sea-Robin*, *Sea-Toad*, and *Pig Fish*, the latter from its croaking noise when drawn out of the water.



THE FOUR-HORNED COTTUS.

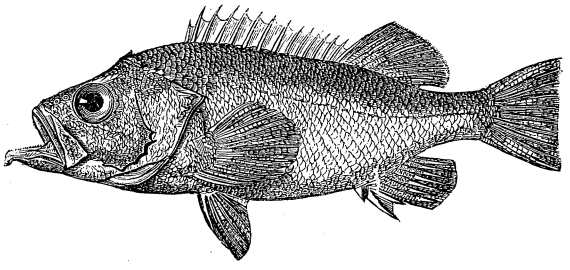
Other American species are the Brazen Bull-Head, *C. æneus*, and Smooth-Browed Bull-Head, *C. Mitchillii*, &c.

Genus ASPIDOPHORUS: *Aspidophorus.*—To this belongs the Armed Bull-Head, *A. Europæus*, noted for being completely covered with horny scales. It has in England the name of *Pogge*, and in Scotland the various titles of *Sea-Poacher*, *Pluck*, and *Noble*. It is common on all the coasts of Europe and Greenland.



THE ARMED BULL-HEAD.

Genus SEBASTES: *Sebastes.*—To this belongs the Bergylt, *S. Norvegicus*, sometimes called *Red Sea-Perch;* it is twelve to twenty-four inches long; found in the northern seas, south to the coast of Massachusetts; is tolerable food; the spines are used in Greenland for needles.

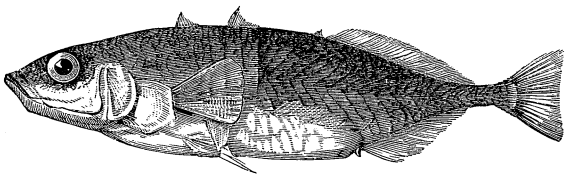


THE BERGYLT.

Genus GASTEROSTEUS: *Gasterosteus.*—This includes the *Sticklebacks*, of which there are several species. They are of small size, usually four or five inches long, but are very interesting, inasmuch as they approach the birds in the art with which they build their nests and the care they take of the eggs and young. The labor falls entirely upon the male, who defends his domicile

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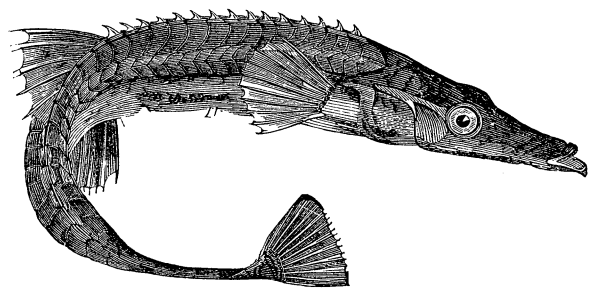
with the greatest courage, and even takes care of the young fry when they are hatched. All this is the more remarkable as there are few instances in which a fish shows any further interest in his offspring than to see that the eggs are deposited in a suitable place. Another curious fact in regard to these fishes is, that under the influence of terror their skin turns suddenly pale.



THE STICKLEBACK.

The COMMON EUROPEAN STICKLEBACK, *G. trachurus*, three inches long, is found both in salt and fresh water. It so abounds in the sluggish streams and pools of the Lincolnshire fens of England, that it is sometimes used for manure.

The FIFTEEN-SPINED STICKLEBACK, *G. spinachia*, is a marine species, and is five to eight inches long. It is very voracious, and one six inches long being put into a pail of water with an eel three inches long, immediately swallowed all but the tail; it was obliged, however, after a time to disgorge it in a half-digested state. Common in European waters.



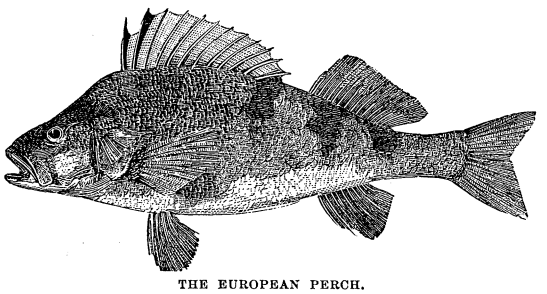
THE FIFTEEN-SPINED STICKLEBACK.

There are several species of this genus on our coasts; among them are the TWO-SPINED STICKLEBACK, *G. biaculeatus*, two to three inches long; the NEW YORK STICKLEBACK, *G. neoboracencis*, nearly of the same size; the FOUR-SPINED STICKLEBACK, *G. quadracus*, and the MANY-SPINED STICKLEBACK, *G. occidentalis*, both somewhat smaller.

THE PERCIDÆ.

This is a very extensive family, comprising many of the fishes most esteemed for the table. They have a large mouth armed with numerous small teeth, among which a few larger fangs are often present. The fins are well developed, the ventrals placed either on the breast or throat, and the skin clothed with ctenoid scales.

Genus PERCA: *Perca.*—To this belong several species abounding in the seas and fresh waters of all parts of the world. The COMMON PERCH of EUROPE, *P. fluviatilis*, is one of the best and handsomest of the fresh water fishes of that quarter of the globe.



THE EUROPEAN PERCH.

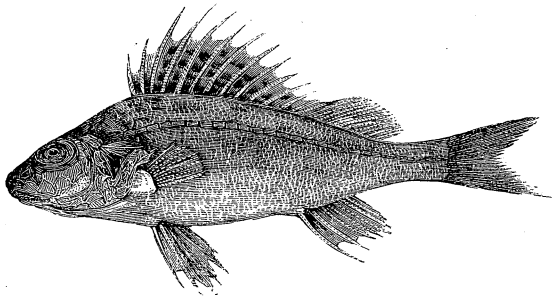
The AMERICAN YELLOW PERCH, *P. flavescens*, is very closely allied to the preceding; it is six to twelve inches long, sides yellow, with six to eight dark vertical bands over the back. It is common in our lakes and ponds, and, as it bites freely, is a favorite with young anglers. It sometimes reaches a weight of three pounds. It is easily transported in water from one place to another, and has been introduced into numerous lakes and ponds in the United States, where it did not originally exist. There are several other American species, all bearing a resemblance to the preceding.

Genus LUCIOPERCA: *Lucioperca*, includes the SANDER, *L. sandra*, of a more elongated form than the perch, and greatly valued for the table. It attains the length of three or four feet; found in Germany and Eastern Europe.

The AMERICAN SANDER, *L. Americana*, the *Common Pike* or *Pickerel* of the great lakes, and often called the *Yellow Pike Perch*, *Ohio Perch*, *Glass Eye*, *Ohio Salmon*, &c., is about

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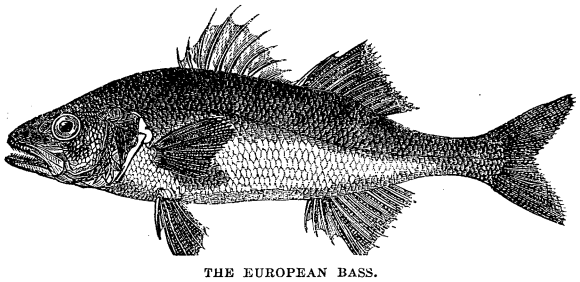
fourteen inches long; is esteemed for the table; frequents rapids and falls near mill-dams; bites strongly at the hook, especially at evening. It is very abundant in the rivers and lakes from the Ohio northward to the Fur Countries. The GRAY PIKE-PERCH, *L. grisea*, is smaller than the preceding; found in the same waters. The CANADIAN SANDER, *L. Canadensis*, is fourteen inches long, and found in the St. Lawrence.



THE RUFFE.

Genus ACERINA: *Acerina*.—To this belongs the RUFFE, or POPE, *A. vulgaris*, a European species, six to eight inches long, closely resembling the perch, and valued for its flesh.

Genus LABRAX: *Labrax*.—To this belong the various species of BASS, some of which are among the greatest delicacies of the table.



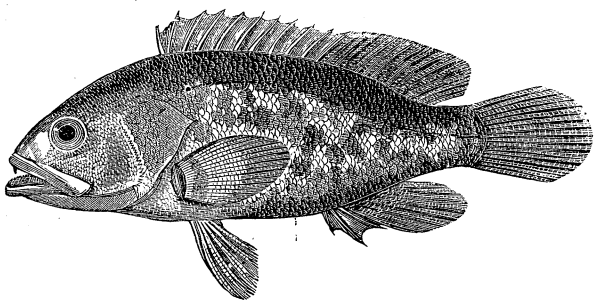
THE EUROPEAN BASS.

The BASS of EUROPE, *L. lupus*, sometimes called SEA-PERCH, and SEA-DACE in England, is one to three feet long, and has been celebrated from the time of Aristotle for its richness and flavor. It abounds in the Mediterranean, and also on the British coasts, where it is taken with trawl-nets, and also by angling at flood-tide with a long rod and strong line.

The species of Bass in this country are numerous. The STRIPED SEA-BASS, *L. lineatus*, is from one to four feet long, brown above and silvery beneath. It is taken by nets, as well as the hook and line, and affords excellent sport. Our markets are well supplied with it throughout the year. It is distributed along our coasts from Delaware to Massachusetts, and bears the different names of *Rock-Fish* and *Bar-Fish*. It ascends the rivers to breed in spring, and often takes refuge in them during the winter; it is, however, chiefly caught between the beach and the outer bar that runs along the shore. They are bold, ravenous, and powerful fish, biting voraciously at almost every sort of bait; soft-crab, clams, and small crustacea are, however, generally preferred. They sometimes attain the weight of seventy pounds. The smaller fishes, however, are most esteemed for the table.

There are several other American species of Bass. The RUDDY BASS, *L. rufus*, eight to ten inches long, is common in the markets of New York. The LITTLE WHITE BASS, *L. pallidus*, often called *Salt-Water Perch*, is five to six inches long. The SMALL BLACK BASS, *L. nigricans*, is six to twelve inches long: and the WHITE LAKE-BASS, *L. albidus*, ten to eighteen inches long. The latter is abundant in Lake Erie.

The BLACK HURON or BLACK BASS, *Huro nigricans*, fifteen to twenty inches long, abounding in the waters of Western New York and in the St. Lawrence, is a fine species, giving great sport to the angler, and valued for the table.



THE DUSKY SERRANUS.

The BLACK SEA-BASS, *Centropristes nigricans*, is six to ten inches long, savory, and delicate; found on our coasts; abundant near Martha's Vineyard.

The GROWLER, *Grystes salmoides*, six to twenty-four inches long, is excellent food; found along our sea-coasts. In South Carolina it is called *Trout*.

Genus SERRANUS: *Serranus*.—

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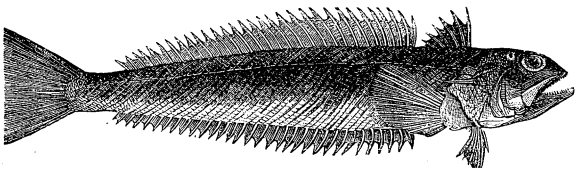
This includes several species, among which is the Dusky Serranus or Dusky Perch, *S. gigas*, common in the Mediterranean, and occasionally found on the shores of Northern Europe; it weighs from twenty to forty pounds; its flesh is in some estimation as food.

The Stone Bass, *S. Couchii*, is noted for following pieces of drift wood, which it finds in the sea; it is rare, but is sometimes taken on the British coasts.

The Groper, *S. erythrogaster*, is two to three feet long; olive-brown above, red beneath. It is brought into the markets along our Atlantic coast, but its flesh is tough and little prized.

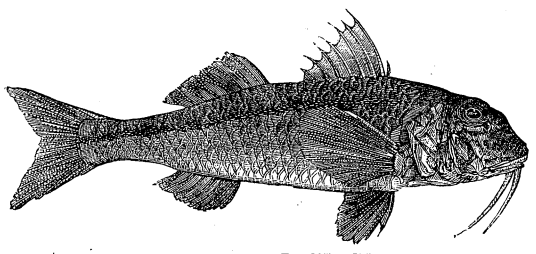
Genus CENTRARCHUS: *Centrarchus.*—To this belong a number of small fishes, as the Fresh-Water Bass, *C. æneus*, Black Fresh-Water Bass, *C. fasciatus*, &c.

Genus TRACHINUS: *Trachinus.*—This includes the Great Weever, *T. Draco*, called *Sting-Bull*, *Sea-Cat*, *Chanticleer*, &c., in England. It is about twelve inches long, lives in deep water, and is noted for inflicting serious wounds with its spines if carelessly handled. The flesh is good. Another species is the Lesser Weever, *T. vipera:* both are common in European seas.



THE GREAT WEEVER.

Genus MULLUS: *Mullus.*—This includes several species, called *Mullets*, greatly esteemed by epicures. In ancient Rome enormous prices were paid for them; one weighing five or six pounds was sometimes sold for two hundred dollars; the Striped Red Mullet, *M. surmuletus*, weighs from two to six pounds; at some seasons it is abundant, and again it is scarce. It appears in the London markets throughout the year. It feeds at great depths, and is aided in its search for food by two long feelers depending from the lower jaw. It is generally taken with the trawl-net. There are other foreign species. The American mullets belong to the genus *Mugil*, and will be hereafter noticed.



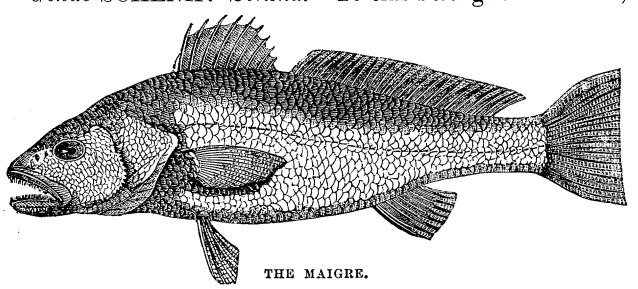
THE STRIPED RED MULLET.

Genus SPHYRÆNA: *Sphyræna.*—To this belongs the Common Sphyræna, *S. vulgaris:* it is two to three feet long, of a shiny bronzed or bluish-black color. The fluid called *Essence d' Orient*, used in the manufacture of artificial pearls, is prepared from the scales of this fish, together with the minute silvery particles of the air-bladder. This manufacture is carried on extensively at Rome. The body of the pearls is of alabaster; these are dipped in the fluid, and when dried have all the shining gloss of true pearls.

THE SCIÆNIDÆ.

This family embraces many species of large, powerful, and rapacious fishes.

Genus SCIÆNA: *Sciæna.*—To this belongs the Maigre, *S. aquila*, four to six feet long, found in the European waters, and common in the Mediterranean. It swims in shoals, each uttering a grunting noise. It was greatly esteemed by the epicures of ancient Rome. When caught by the fishermen, its struggles are so violent as sometimes to knock a man down. The bones of the ear are very large, and were formerly supposed to be capable of curing the colic in persons to whom they were presented. Hence they were called *Colic-Stones*, and were even set in gold and worn as amulets.



THE MAIGRE.

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Genus LEIOSTOMUS: *Leiostomus.*—This includes the SEA-CHUB or LAFAYETTE, *L. obliquus*, six to eight inches long; delicious for the table; common on our southern coast.

Genus OTOLITHUS: *Otolithus.*—This includes the WEAK FISH or SQUETEAUGUE, *O. regalis*, one to two feet long, sometimes weighing thirty pounds; it is tolerable food, and is much angled for on our coasts; found from the Mississippi to the Gulf of St. Lawrence.

Genus CORVINA: *Corvina.*—To this belongs the LAKE SHEEP'S-HEAD, *C. oscula*, twelve to eighteen inches long; is indifferent food; found in Lake Erie.

The BRANDED CORVINA, *C. ocellata*, one to three feet long, is a beautiful species, and highly relished; found on our Atlantic coast. At the South it is called *Bass*, at New Orleans, *Red Fish*.

The MALASHEGANY, *C. Richardsonii*, is one to two feet long: common in Lake Huron, where it is greatly prized for food, and where it is called BLACK SHEEP'S-HEAD.

Genus UMBRINA: *Umbrina.*—This includes the BEARDED UMBRINA, *U. vulgaris*, two to three feet long, and sometimes weighing forty pounds; the flesh is white and good: common on the coasts of France, Spain, and Italy. The KING-FISH, *U. nebulosa*, sometimes called the *Bermuda Whiting*, is twelve to eighteen inches long; found along our coasts; abundant at the south.

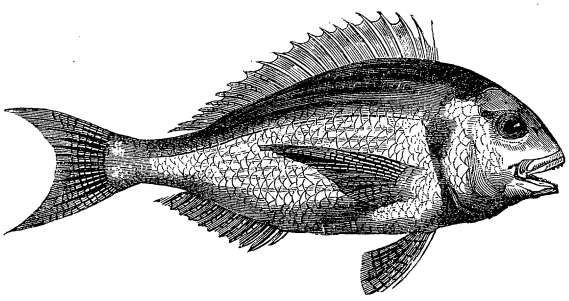
Genus POGONIAS: *Pogonias.*—To this belongs the BIG DRUM, *P. chromis*, two to four feet long, and sometimes weighing a hundred and twenty-five pounds; the young are delicate food, the old are coarse; found on the coast from New York to Florida.

There are several other American genera of the family *Sciænidæ*.

THE SPARIDÆ.

This family includes several valuable species, European and American, all living in the sea.

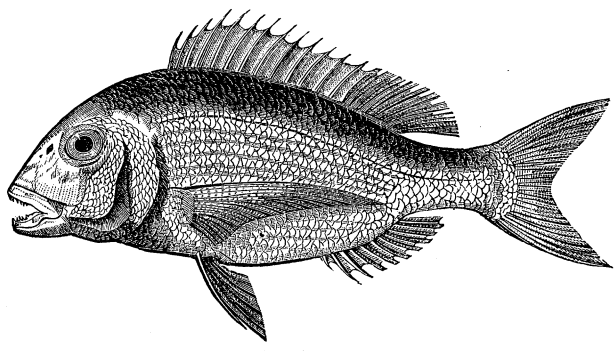
Genus CHRYSOPHRYS: *Chrysophrys.*—This includes the GILT-HEAD, *C. aurata*, twelve inches long; abundant in the Mediterranean, and found on the coasts of Africa and Europe, from France to the Cape of Good Hope. It frequents deep water on bold rocky coasts, and is occasionally taken both by nets and lines.



THE GILT-HEAD.

The ACULEATED GILT-HEAD, *C. aculeata*, is twelve to twenty-four inches long; found on our coast.

Genus PAGRUS: *Pagrus.*—To this belong the BRAIZE or BECKER, *P. vulgaris*, very voracious; found in the European seas; and the BIG PORGEE, *P. argyrops*, eight to twelve inches long; of excellent flavor, and common from Cape Cod to Charleston.



THE BRAIZE.

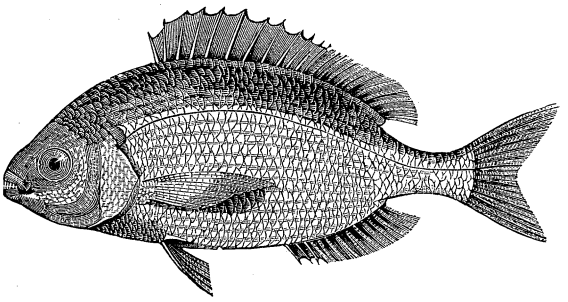
Genus PAGELLUS: *Pagellus.*—This includes the SEA-BREAM, *P. centrodontus.*—This feeds on fish as well as sea-weed; it is not much esteemed for eating; common in the European seas.

Genus CANTHARUS: *Cantharus.*—This includes the BLACK-BREAM, *C. griseus*, twelve to fifteen inches long, feeding like the preceding: found in the European seas.

Genus SARGUS: *Sargus.*—This includes the SHEEP'S HEAD, *S. ovis*, one to three feet long, of a dull silvery color on the sides, with brassy tints on the back; derives its name from the resemblance of the mouth and teeth to those of a sheep. It is

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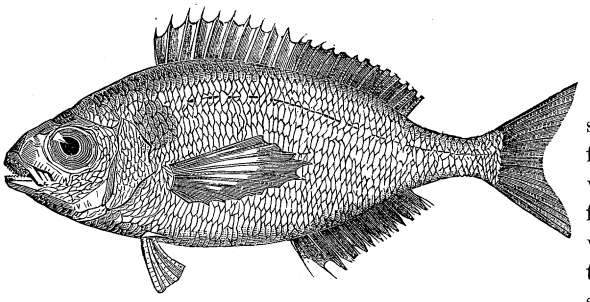
taken with hook and line in deep water on our coasts; is shy and wary, and battles bravely when caught. It is sometimes taken with the line in the shallow bays of Long Island. Its flesh is in the very first rank with epicures. Its range is from Cape Cod to the Mississippi.



THE SEA-BREAM.

The SAND PORGEE, *S. arenosus*, six inches long, is palatable food; caught in seines on the south side of Long Island Sound.

The RHOMBOIDAL PORGEE, *S. rhomboides*, is three to five inches long, and is common on our southern coast.



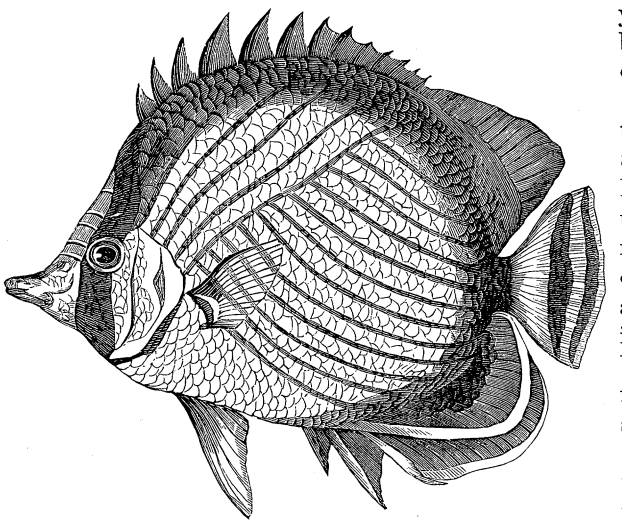
THE BLACK BREAM.

THE CHÆTODONTIDÆ.

This is a very numerous family, the species being generally of small size; the form is exceedingly compressed, the body wide and short, resembling that of the flat-fishes, though they swim upright in the water; the eyes are placed on each side of the head, and both sides of the body are similarly colored. The mouth is usually small and furnished with bristle-like teeth. They are generally delicate and well flavored, and are noted for the brilliancy of their coloring.

Genus BRAMA: *Brama.*—This includes the RAY'S BREAM, *B. Raii*, from one foot to two feet six inches long; common in the Mediterranean, and occasionally found in the British seas. Its flesh is highly esteemed. It is the only European species.

Genus CHÆTODON: *Chætodon.*—This includes the WANDERING CHÆTODON, *C. vagabundus*, twelve inches long, body of a pale yellow color, with numerous oblique, brownish-purple lines. Inhabits the coasts of Ceylon.



THE WANDERING CHÆTODON.

Genus CHELMON: *Chelmon.*—To this belongs the FLY-SHOOTER, *C. rostratus*, inhabiting the fresh waters of India and the Asiatic Islands. It feeds upon insects, and is remarkable for its mode of procuring them. When it observes a fly, or any other insect on a weed, or hovering over the water, it ejects a little drop through its tubular snout with such precision as frequently to disable the little animal, so that it falls into the water and is devoured. In countries where this fish abounds, it is frequently kept in vessels of water, and affords much entertainment by the dexterity displayed in shooting at the flies, which are placed on the vessel for the purpose; it generally approaches to within five or six inches before the drop of water is ejected. A Javanese species, the *Toxotes jaculator*, exhibits the same

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curious instinct. It has a wide mouth, with the lower jaw considerably projecting; it throws a large jet of water with such force and precision as almost invariably to bring down a fly at the distance of two or three feet.



THE FLY-SHOOTER.

The *Genus* EPHIPPUS: *Ephippus.*—Includes the BANDED-EPHIPPUS, *E. faber*, five to eighteen inches long. It appears occasionally in great numbers on our coasts during summer. The fishermen call it *Three-tailed Sheep's-Head* and *Three-tailed Porgee*. In South Carolina it is called *Angel-Fish*. Its range extends from New York to Rio Janeiro.

The MOON-FISH, *E. gigas*, is fifteen inches long, and has the same geographical distribution as the preceding. The body is of an oblong oval; the scales large, the teeth conical, bristly, and in numerous series. The color is dark bluish brown, with metallic reflections; the sides of the head are tinged with lustrous green.

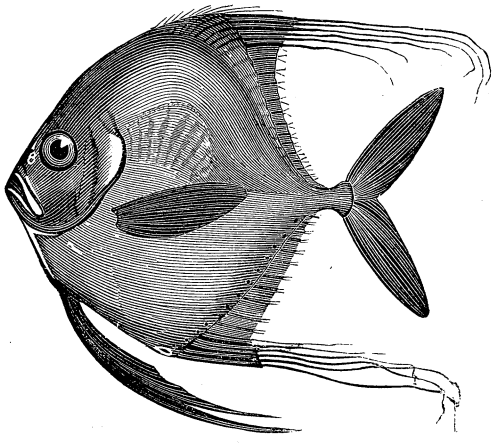
Genus PIMELEPTERUS: *Pimelepterus.*—To this belongs the RAZOR-FISH, *P. Boscii*, six inches long; the form of the body is oval; the color brownish, with faint longitudinal lines; found on our northern coasts.

THE TEUTHIDÆ.

This includes a small number of fishes, all inhabitants of hot climates, remarkable for having the sides of the tail armed either with sharp prickles or a large curved spine. They are also noted as being herbivorous fishes, and feeding on sea-weed. The species with spinous tails, if incautiously handled, inflict severe wounds on their captors. The SURGEON, *Acanthurus chirurgus*, a West Indian species, received its popular name from its dangerous qualities in this respect.

THE SCOMBERIDÆ.

This great family includes two divisions, all of which live in the sea, and are of predaceous habits. In the first division the body is short, broad, and compressed, presenting a resemblance to the *Chætodontidæ*. In the other the form is more attenuated. Of the first the *Blepharis* may be taken as a type; of the last, the *Mackerel*.



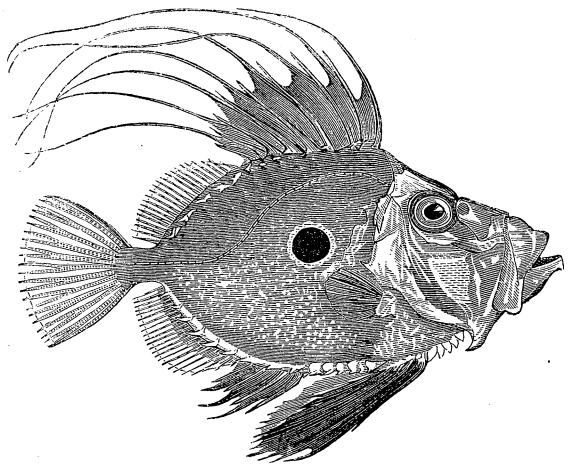
THE BLEPHARIS.

Genus BLEPHARIS: *Blepharis.*—This includes the HAIR-FINNED BLEPHARIS, *B. crinitus*, five to six inches long; bluish-white above, shiny beneath; found, though rarely, on the American coast.

Genus ZEUS: *Zeus.*—This includes the JOHN DOREE, *Z. faber;* average weight five pounds; found on the European coasts, and celebrated for the delicacy of its flesh. This fish, having a golden spot on each side of it, contends with the haddock for the honor of bearing the marks of St. Peter's fingers, each being supposed to have been that out of whose mouth the apostle took the tribute-money, leaving on its sides in proof of the identity, the marks of his finger and thumb. There is another origin assigned to the golden spots; an old legend says that St. Christopher, in wading through an arm of the sea, bearing our Saviour, caught a Doree, and

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left these impressions on its sides, as a perpetual memorial of the fact. Probably the name of this fish is derived from the French, who call it *Jaune Dorée*, referring to its peculiar golden-yellow color.

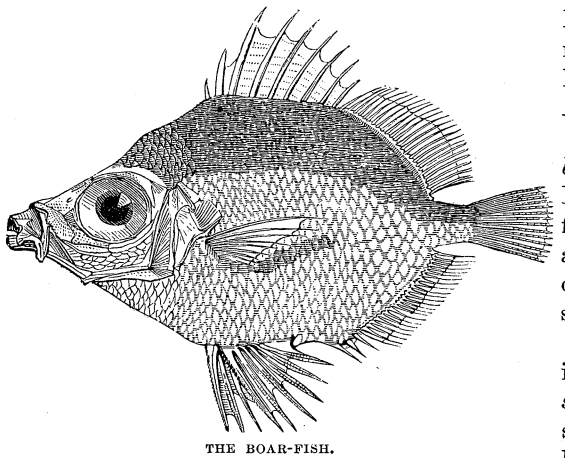


THE JOHN DOREE.

Genus CAPROS: *Capros.*—This includes the BOAR-FISH, *C. aper*, six to eight inches long; found in the European seas.

Genus LAMPRIS: *Lampris.*—This includes the OPAH, *L. guttatus*, a beautiful and rare species, found on the European coasts. One was taken at Dieppe several years ago, four feet six inches long, and weighing one hundred and forty pounds.

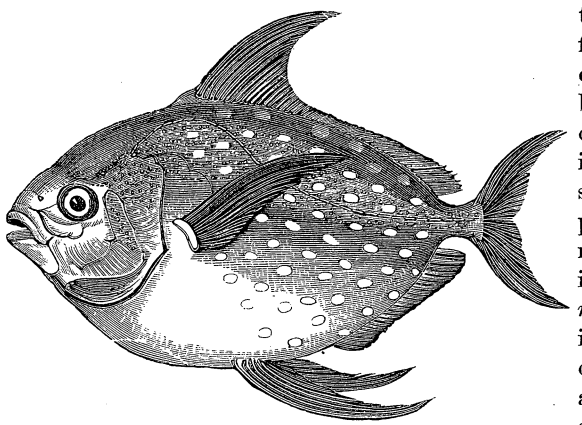
Genus CARANX: *Caranx.*—This includes the SCAD, *C. trachurus*, fifteen to twenty inches long; caught in great numbers on the coast of Ireland, and common on the British coast; also in the Mediterranean. It resembles the common mackerel, but is much inferior, and hence is very generally called *Horse-Mackerel.*



THE BOAR-FISH.

Genus CENTROLOPHUS: *Centrolophus.*—This includes the EUROPEAN BLACK-FISH, *C. pompilus*, two to three feet long, remarkable for its swiftness and voracity; the color is black, the body covered with minute scales. It is a rare species, found in the European seas.

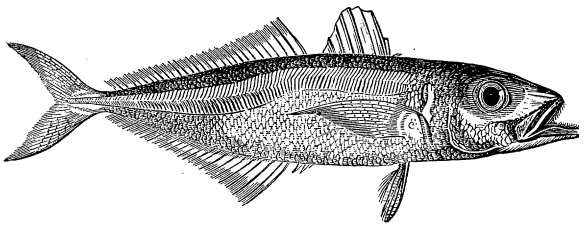
Genus SCOMBER: *Scomber.*—This includes the COMMON MACKEREL, *S. scomber*, which is eaten both fresh and salted, and is caught in immense numbers in Europe and America. It is fourteen to twenty inches long, weighing from one to two pounds; the shape is elongated and spindle-like; the colors brilliant and beautiful. It usually spawns during the months of May and June, and it is when approaching the shores in vast shoals for this purpose, that they are principally taken. The most common mode in which the fishing is carried on in England, is by means of long *drift-nets*, which often extend for nearly a mile in length, descending into the water to a depth of about twenty feet. These nets are let down into the water at nightfall, and left in position all night, suspended to a stout rope, which is supported at one extremity by a large buoy, and at the other attached to the fishing-boat. The meshes of the net are just large enough to allow the fish to pass through at the pectoral fins, so that when



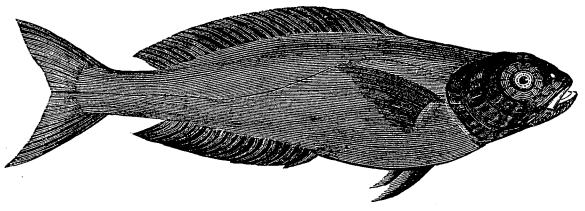
THE OPAH.

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they have advanced thus far, they are held suspended in the net, without the power of escaping, either by retracing their course or pressing the thick part of their bodies through the obstacle. In the morning the nets are hauled in, and the fish detached from them, and in this manner vast quantities are taken. The mackerel is also captured by surrounding the shoals with a large deep net or seine, which is afterward closed at the bottom, or hauled to the shore; and a considerable number are taken with the hook and line. It is a voracious fish, feeding principally on small fish and the fry of larger species.



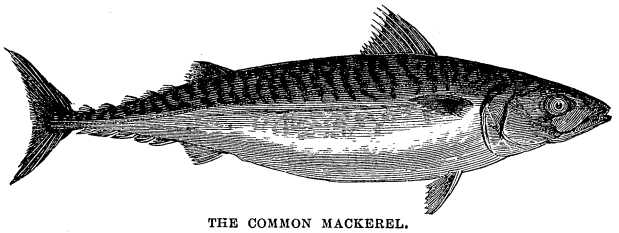
THE SCAD.



THE EUROPEAN BLACK-FISH.

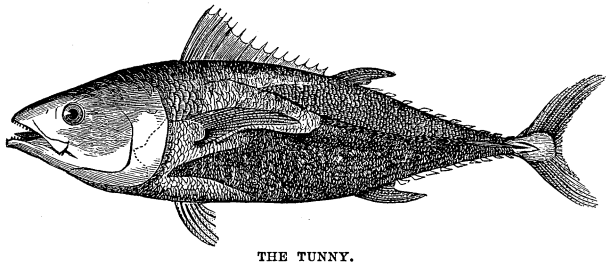
The American Spring Mackerel, *S. vernalis* of Mitchill, is probably the same species as the preceding. The number of this taken in our waters is immense; on the coasts of Massachusetts two hundred vessels are sometimes engaged in the mackerel fisheries, and two hundred and fifty thousand barrels are taken.

The Fall Mackerel, *S. grex*, is sometimes very abundant in our seas; some authors regard it as the young of the preceding.



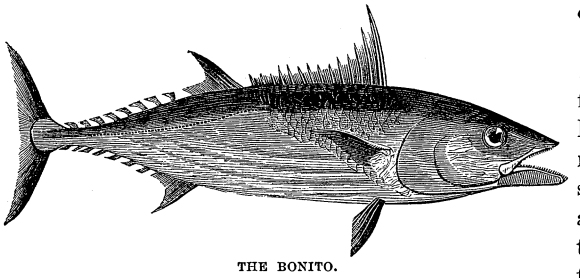
THE COMMON MACKEREL.

The Spanish-Mackerel, *S. colias*, is greatly esteemed for the table; it is smaller than the spring mackerel; common in Europe; the same, or a very similar species, is found, though not abundantly, on our coasts.



THE TUNNY.

Genus THYNNUS: *Thynnus.*—This includes the Common Tunny of Europe, *T. vulgaris*, a large species, four to twenty feet long, and sometimes weighing a thousand pounds. It is found in the European seas, but is most common in the Mediterranean, where it is caught in large numbers. The nets used are very large and strong, and one of them costs six thousand dollars. This fish has been celebrated for the table since the time of Aristotle. It is frequently taken on our coasts, and is not uncommon in the markets of our principal northern cities.

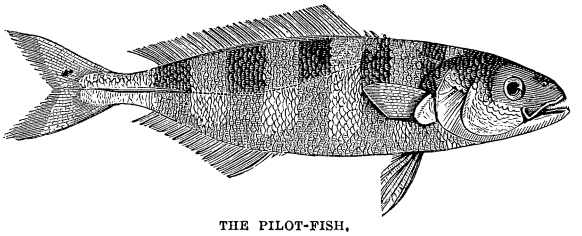


THE BONITO.

The Bonito, or Striped-bellied Tunny, *T. pelamys*, resembles the preceding in form, but is seldom more than thirty inches long. It is extensively distributed, being most common in the tropical seas, but is still met with on the coasts of Europe and North America. It is said to rival the dorado in its perpetual chase of the flying-fish. There are one or two other species allied to the Tunny, which are also sometimes called *Bonito.*

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Genus NAUCRATES: *Naucrates.*—This includes the PILOT-FISH, *N. ductor*, noted for its habit of accompanying ships for weeks together; the ancients even asserted that it pointed out the proper course to the mariner when he was at a loss how to proceed, leaving him when he had arrived in sight of the desired haven. It appears probable, however, that the Pilot-Fish only attends the voyager for the sake of the numerous pieces of food which are constantly being thrown overboard; and a community of feeling in this respect may perhaps account for the frequent association of the Pilot-Fish and the Shark. It is, however, a general opinion among navigators that the Pilot-Fish really attends upon the Shark as a guide; and an instance has been related in which two of them led a shark to a baited hook that had been thrown out for him. Another observer, however, states that he saw a shark, which was inclined to swallow a bait put out for him, prevented from doing so by one after another of four Pilot-Fishes which accompanied him; and that when at length the shark had swallowed the tempting morsel and was being hauled out of the water, one of his diminutive friends clung to his side for some little time. Colonel Hamilton Smith also states that he had witnessed a similar circumstance. The Pilot-Fish attains a length of about a foot. It is somewhat of the mackerel form, of a silvery-gray color, bluish on the back, and adorned with five dark blue bands, which go round the whole body. Its flesh is said to be very good. It is extensively distributed throughout the Atlantic, and is said to be occasionally seen on our coasts.



THE PILOT-FISH.

The NEW YORK PILOT-FISH, *N. Noveboracensis*, resembles the preceding, and may be of the same species.

THE XIPHIIDÆ.

This family includes several species called SWORD-FISHES.

Genus XIPHIAS: *Xiphias.*—This includes the COMMON SWORD-FISH, *X. gladius;* it is twelve to twenty feet long, and has the upper jaw prolonged into a long, bony, spear-like weapon. It is most predaceous in its habits, employing its spear for the destruction of the larger fishes. It is even said to attack whales. Its activity and strength are very great; and it has been known to strike at ships passing through the water, and to bury its weapon in their timbers. Cuvier states that a parasitic crustacean buries itself in the flesh of the sword-fish, and torments it to such a degree that it will sometimes rush upon the shore; the same cause of irritation may perhaps have something to do with its suicidal attacks upon such a very unequal antagonist as a ship. This species is found in European and North American waters; the seas of tropical climates contain several others. Their flesh is said to be exceedingly good, especially when young.

THE CORYPHÆNIDÆ.

This includes, among other species, the DORADO, *Coryphæna hippurus*, sometimes called *Dolphin*, noted for its beautiful metallic tints, the swiftness of its course, and for the perpetual war of destruction which it wages against the flying-fish. It is about five feet long, the back bluish, the body yellow, the whole spotted with darker hues. When in the water it presents a splendid golden luster, which rapidly vanishes when taken out of its natural element. This fish is common in the tropical seas of the Atlantic.

The BOTTLE-HEADED DOLPHIN, *C. globiceps*, resembles the preceding, and has been taken on our coasts.

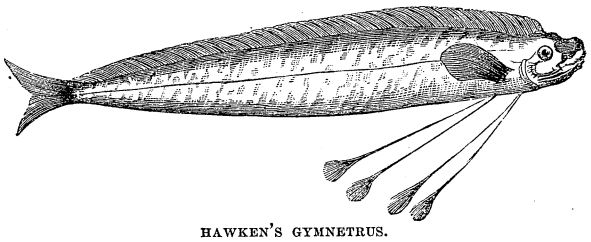
THE NOTACANTHIDÆ.

This family includes several species of fishes which have an elongated, eel-like form, the hinder extremity being usually surrounded by the same continuous fin that is characteristic of the eels. The whole surface is covered with small cycloid scales. Most of the species inhabit the tropical regions, some living in salt and some in fresh water. One species, the *Notacanthus nasus*, is found in the Arctic Ocean.

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THE CEPOLIDÆ.

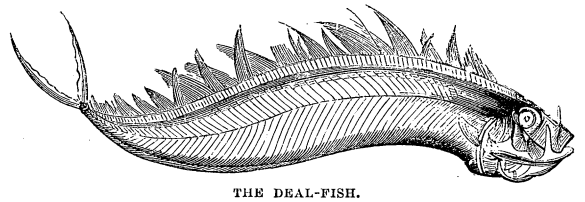
This family includes several species of an elongated, compressed form, and called *Ribbon-Fishes.*



HAWKEN'S GYMNETRUS.

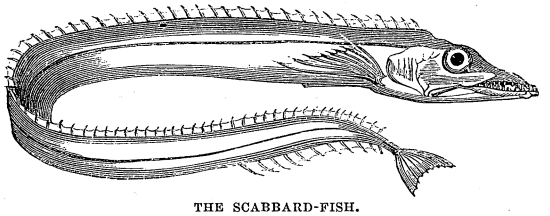
Genus GYMNETRUS: *Gymnetrus.*—This includes BANK'S GYMNETRUS, *G. Banksii*, ten to twelve feet long, and less than three inches thick. It is of a beautiful silvery color, with a few blackish streaks and spots. It is found in the European seas.

HAWKEN'S GYMNETRUS, *G. Hawkenii*, eight to ten feet long, depth ten inches, thickness less than three inches; color dusky green; found in the European seas.



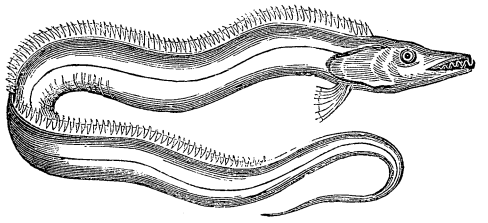
THE DEAL-FISH.

The DEAL-FISH, *G. Arcticus*, is four to six feet long, breadth eight inches, thickness one inch; found in the North Atlantic, and has been taken on the British coasts. It is called *Vaagmaer* in Iceland.



THE SCABBARD-FISH.

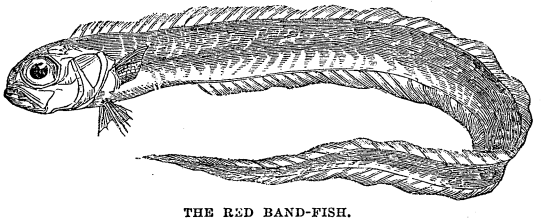
The SCABBARD-FISH, *Lepidopus argyreus*, is four to six feet long, and swims with great swiftness: the skin is smooth, except a few scales in place of the ventral fins; the flesh is said to be good.



THE SILVERY HAIRTAIL.

The SILVERY HAIRTAIL, *Trichiurus lepturus*, is two to four feet long, of a shiny silvery color; called *Ribbon-Fish* on our coast and *Sword-Fish* in Jamaica. Extensively distributed along the Atlantic shores.

Genus CEPOLA: *Cepola.*—To this belongs the RED BAND-FISH or RED SNAKE-FISH, *C. rubescens*, one to two feet long, color orange-red; moving in the waters it appears like a red ribbon. This, as well as other species of this family, is often found cast on the shores by storms.

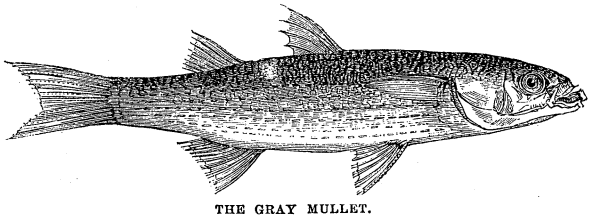


THE RED BAND-FISH.

THE MUGILIDÆ.

This family includes a few species having a spindle-shaped body, which is covered with large scales; they generally inhabit salt water, keeping about the mouths of rivers, ascending and descending with the ebb and flow of the tide.

Genus MUGIL: *Mugil.*—This includes the EUROPEAN GRAY MULLET, *M. capito*, which is to be distinguished from the other mullets of the genus *Mullus.* It is a small fish, common in Europe, and greatly esteemed for its delicacy. It is very active, and frequently escapes from the fishermen by leaping over their nets. There are several other European species.

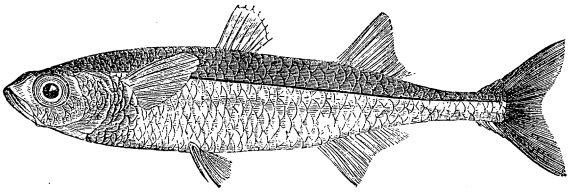


THE GRAY MULLET.

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Among the American species are the STRIPED MULLET, *M. lineatus*, six to eight inches long; found on our coast, and esteemed excellent food; the WHITE MULLET, *M. albula*, nine inches long; a plump, firm fish; appears in our markets in July and August, and is in high repute with the epicures: the ROCK-MULLET, *M. petrosus*, six to seven inches long; ranges on the coast from New York to Brazil: and the SPOTTED MULLET, *M. Plumieri*, which resembles the preceding.

Genus ATHERINA: *Atherina.*—This includes the SAND-SMELT or ATHERINE, *A. presbyter*, five or six inches long; it is esteemed for the table, and resembles the common smelt in flavor; found in the European waters.



THE SAND-SMELT.

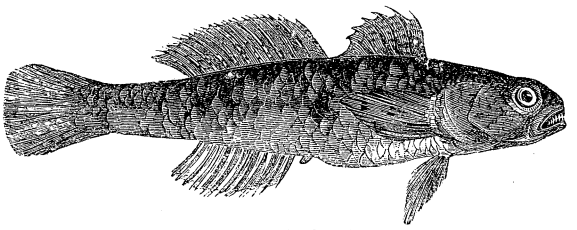
The DOTTED SILVERSIDE, *A. notata*, three to four inches long, is much esteemed for food, and is found on our coasts from Massachusetts to Cape Cod.

The GREEN or SLENDER SILVERSIDE, *A. menidia*, is four to five inches long, and found on the coasts of New York.

Genus ANABAS: *Anabas.*—To this belongs the CLIMBING-PERCH, *A. scandens*, found in India. In this the pharyngial bones are formed to retain a supply of water in cells, so that the fish is able to quit the ponds and streams in which it usually resides, for five or six days, and to wander to a considerable distance over the land. Sometimes it will even ascend the trunks of trees for a short distance, from which circumstance it derives its common name. This and some other species of the family are frequently exhibited by the jugglers of India and China, where they are common. The flesh of all these species is extremely good, and one of the size of a turbot, is said to equal that celebrated fish in delicacy of flavor.

THE GOBIIDÆ.

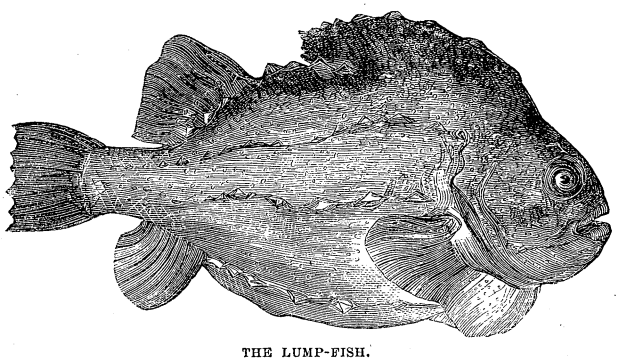
These fishes, noted for the absence of the air-bladder, are for the most part small, keeping close to the shore, usually among rocks, and often attach themselves by means of their disc-like ventral fins to the lower surface of rocks and other objects. Some kinds are abundant in tidal waters. The male of one species, found in the Mediterranean, makes a nest, and watches over and defends the spawn with care and courage.



THE BLACK GOBY.

Genus GOBIUS: *Gobius.*—This includes the BLACK GOBY or ROCK-FISH OF EUROPE, *G. niger;* it is five to six inches long, and found on the rocky coasts of Europe. It is not esteemed for food.

Other species are the SPOTTED GOBY, *G. minutus*, called *Polewig* in England, and the DOUBLE-SPOTTED GOBY, *G. bipunctatus*, both European species. The VARIEGATED GOBY, *G. alepidotus*, two or three inches long, is found on our coasts.



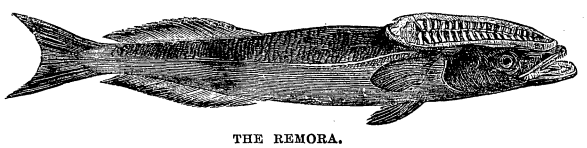
THE LUMP-FISH.

Genus CYCLOPTERUS: *Cyclopterus.*—To this belongs the LUMP-FISH, *C. lumpus:* also called *Lump-Sucker* and *Sea-Owl* in England, and *Cock-Paddle* and *Hen-Paddle* in Scotland; in France *Licorne de Mer.* It is of a thick, massive form, and often weighs as much as six or seven pounds; it is of a purplish-black color, variegated with red and brown above; the belly is crimson; the flesh is soft and insipid. The back and sides are marked with rows of tubercles, and the appearance of

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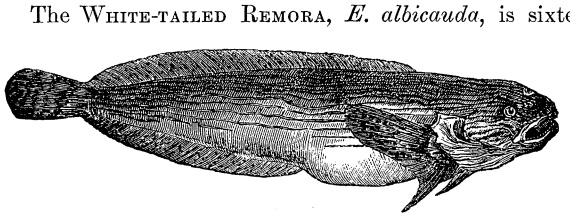
the fish is altogether grotesque. It has a cup-shaped sucker, formed of the ventral fins, by which it will adhere so firmly to a stone or other substance in the water, that it is difficult for a man to pull it up. It feeds on jelly-fishes, and is itself a favorite repast for seals. It is found in the Northern European and American waters. There are several other species.

Genus ECHENEIS: *Echeneis.*—This includes the REMORA or SUCKING-FISH, *E. remora:* it is about a foot long, and is provided with a powerful sucker on the top of its head, by which it attaches itself to rocks, ships, and even large fishes. In ancient times it was believed that the Remora had the power of arresting the largest ship in her course, and among other tales of the kind, we are told that in the famous battle of Actium, Antony's ship was held motionless by one of these fishes, notwithstanding the utmost exertions of several hundred sailors to row it forward. Found in European and North American waters; most common in the Mediterranean.



THE REMORA.

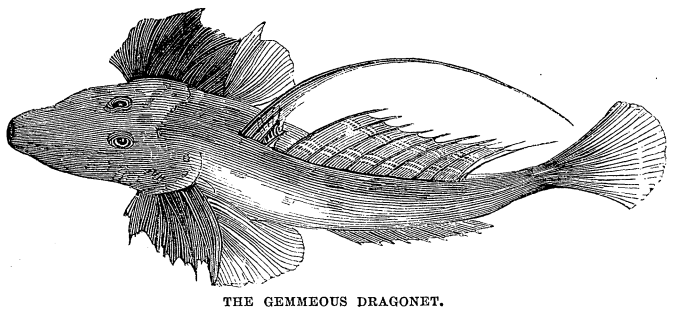
The WHITE-TAILED REMORA, *E. albicauda*, is sixteen inches long, and is frequently found attached to sharks, whence it is called the *Shark-Sucker*. It is occasionally taken on the shores of Long Island. The INDIAN REMORA, *E. naucrates*, is two to three feet long; found on the North American coasts.



THE SEA-SNAIL.

Genus LIPARIS: *Liparis.*—To this belongs the SEA-SNAIL or UNCTUOUS SUCKER, *L. vulgaris*, four inches long; found in the European seas. MONTAGU'S SUCKING-FISH, *L. Montagui*, is three inches long; found on the British coasts.

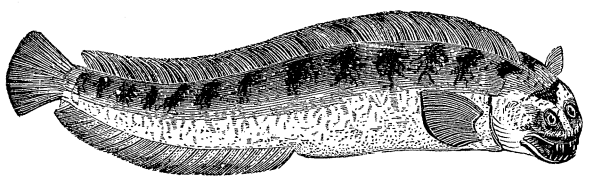
Genus CALLIONYMUS: *Callionymus.*—This includes the GEMMEOUS DRAGONET, *C. lyra*, ten to fourteen inches long; it has a smooth skin, brilliantly striped and spotted with blue on a yellow ground. It occasionally takes a bait, but is more frequently caught in nets. Its flesh is good. It is found on the European coasts; in England it is called the *Yellow Sculpin*, and in Scotland the *Gowdie*. The SORDID DRAGONET, *C. dracunculus*, is nine to ten inches long. Found in European waters.



THE GEMMEOUS DRAGONET.

THE BLENNIIDÆ.

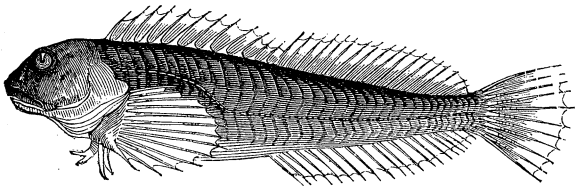
Genus ANARRHICAS: *Anarrhicas.*—To this belongs the SEA-WOLF, *A. lupus*, three to seven feet long, agreeing with the gobies in the absence of the air-bladder; the dorsal fin is very long, the pectoral fin large; the mouth large and armed with enormous acute fangs. It feeds on molluscous animals, and easily crushes their shells with its powerful teeth. It is sometimes taken in nets, but makes a desperate resistance. Its flesh is good, and being abundant in Iceland, it is of great importance to the inhabitants; the flesh is salted by them; the liver is used instead of soap, and the skin is made into shagreen for bags and pouches. In England, as well as in this country, it is called *Sea-Cat* and *Wolf-Fish;* common on the European and American coasts.



THE SEA-WOLF.

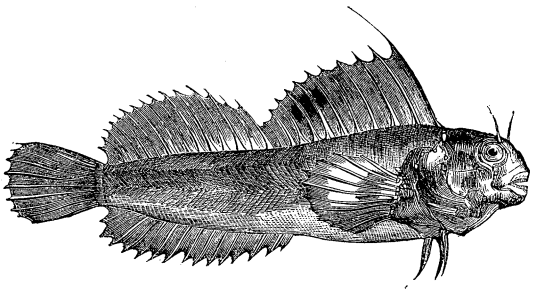
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Genus BLENNIUS: *Blennius.*—This includes several species, some of which produce living young, which are able to take care of themselves from their birth. They live along the rocky shores of the sea, and are often found in rock-pools left by the retiring tide.



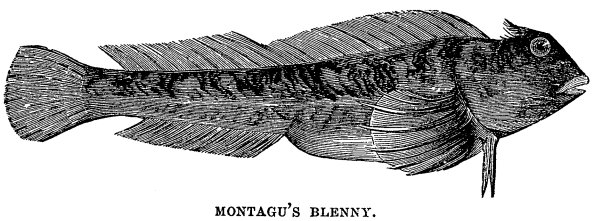
THE SHANNY.

The SHANNY, *B. pholis*, is a very curious species, five inches long, remarkable for creeping out of the water with their pectoral fins and hiding themselves in holes among the rocks, where they remain till the return of the tide; it is said they can live out of water for thirty hours; they immediately die, however, on being put into fresh water. Found on the British coast.



THE OCELLATED BLENNY.

The OCELLATED BLENNY or BUTTERFLY-FISH, *B. ocellaris*, is three to four inches long, the color pale-brown, lives among weeds, and feeds on crustacea; common in the Mediterranean.



MONTAGU'S BLENNY.

Other European species are the GATTORUGINOUS BLENNY, *B. gattorugine;* the CRESTED BLENNY, *B. palmicornis*, and MONTAGU'S BLENNY, *B. Montagui.* Two or three species are found on our coasts.

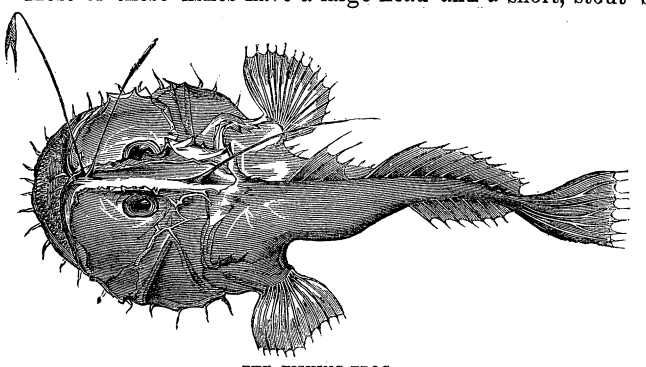
Genus MURENOIDES: *Murenoides.*—To this belongs the SPOTTED GUNNEL or BUTTER-FISH, *M. guttata*, so called on account of the mucous secretion with which its sides are covered; it is ten inches long, and has a long, sword-shaped body; it is found in pools left by the tide, and occasionally under stones or sea-weed; common in Europe. The AMERICAN BUTTER-FISH, *Gunnellus mucronatus*, resembles the preceding.



THE SPOTTED GUNNEL.

THE LOPHIIDÆ.

Most of these fishes have a large head and a short, stout body, terminated by a slender tail. They are covered with a naked skin, usually roughened with warts and tubercles, and can sustain a considerable absence from water.

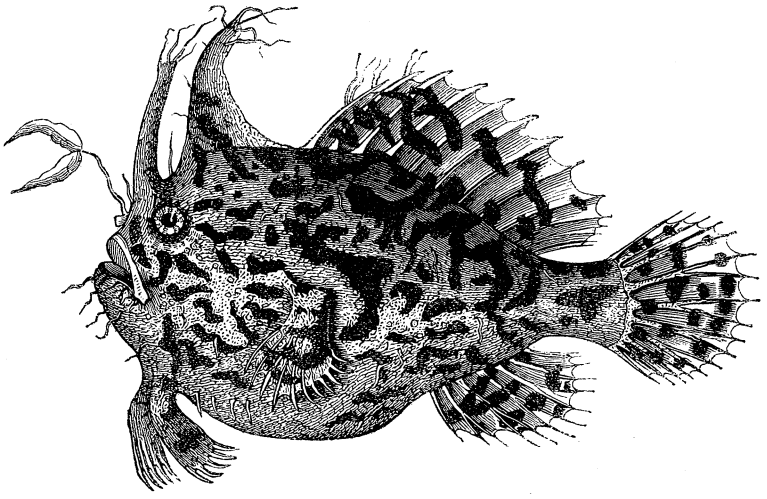


THE FISHING-FROG.

Genus LOPHIUS: *Lophius.*—To this belongs the FISHING-FROG, *L. piscatorius*, three to five feet long. It has an enormous mouth, armed with numerous pointed teeth. It is exceedingly voracious, and has been known to seize a cod just as it was being drawn out of water by a hook, and only let go its hold on receiving a severe blow upon the head. It also has a method of catch-

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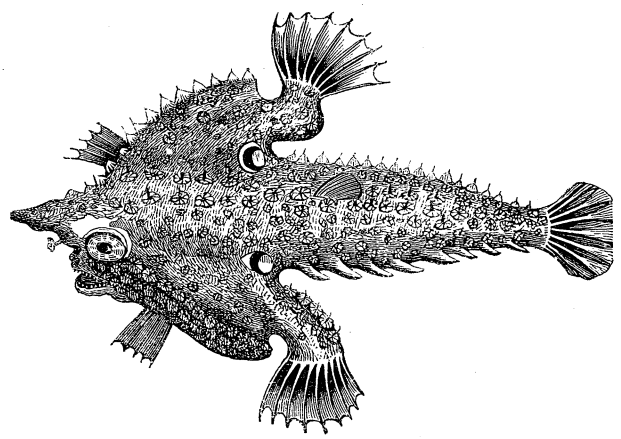
ing fish which shows much cunning: it lies close to the ground, muddles the water so as to conceal itself, and then vibrates the bony filament which stands erect on its head. The fishes see the shining tip, and thinking it something good to eat, advance upon it, and are seized by the artful fisherman beneath. On account of this stratagem this fish is called the *Angler*. Its monstrous appearance has also given it the titles of *Sea-Devil*, *Bellows-Fish*, *Goose-Fish*, *Monk-Fish*, &c. It is not eaten, but when it happens to be captured by fishermen it is preserved for the various fishes usually found in its capacious stomach. It is found in European and American waters.



THE CHIRONECTES HISTRIO.

Genus CHIRONECTES: *Chironectes*.—To this belong nearly thirty species of small fishes, of which the GIBBOUS MOUSE-FISH, *C. gibbus*, is an American example. It is two inches long; color pale brown; common on the American coast. The *C. histrio* is a larger species, found in Brazil. On the northern coasts of Australia, there are fishes of this genus, so abundant and so lively in jumping out of the water, that they have been mistaken for flocks of birds.

Genus BATRACHUS: *Batrachus*.—This includes the COMMON TOAD-FISH, *B. tau*, six to twelve inches long; has an enormous head; usually lies half buried in the mud, where it either silently sucks in small marine animals, or seizes upon such as may incautiously come within its reach; common on our coasts from Maine to Mexico. Its flesh is little prized, but if skillfully cooked is very good. Another species in our waters is the TWO-SPINED TOAD-FISH, *B. celatus*.



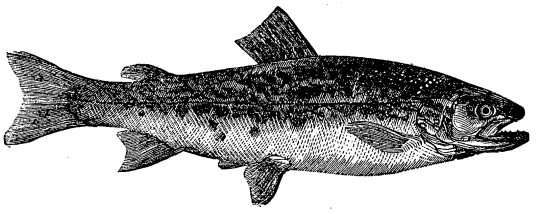
THE BAT MALTHÆA.

Genus MALTHÆA: *Malthæa*.—This includes the SHORT-NOSED MALTHEA, *M. nasuta*, six to seven inches long. The body is compressed in front, and tapering and compressed from behind the pectorals. The head is prominent and apparently elevated above the jaws. The surface is covered with scaly discs; eyes lateral, large, and circular; mouth protractile, with minute card-like teeth on the jaws; color dull brown. It is a rare species, having a range from Labrador to the Caribbean Sea. Little is known of its habits. The DOTTED MALTHEA, *M. notata*, is three and a half inches long; found on the American coasts. The BAT MALTHEA, *M. vespertilio*, is ten to eighteen inches long, pale grayish-brown, snout elongated into a point; skin like shagreen, with long scattering tubercles. It is common in the Caribbean Sea, and is found as far north as Newfoundland. There are several other species known near the Bahama Islands.

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THE PHARYNGOGNATHA.

This division, according to Müller, embraces two groups, which he calls the *Malacopterygii* and *Acanthopterygii*, the names adopted by Cuvier for his primary division of osseous fishes. It contains several remarkable genera.

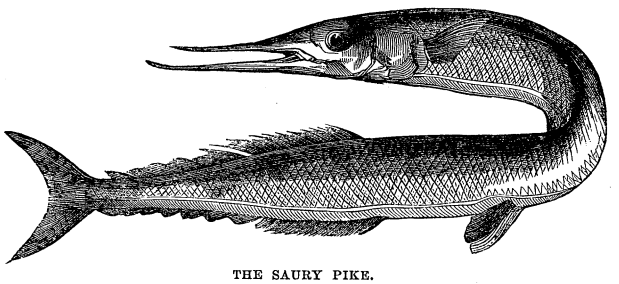


THE GAR-FISH.

Genus BELONE: *Belone.*—To this belongs the GAR-FISH, *B. vulgaris*, two feet long, with the under jaw greatly produced; it swims near the surface; bites at a hook; makes violent resistance when drawn up, and emits a strong smell when just taken. It is sometimes called *Mackerel-Guide*, from its preceding the shoals of mackerel when they visit the shallows for the purpose of spawning. It is also called *Sea-Needle*, *Long-Nose*, *Horn-Fish*, &c. Common in European seas.

The BANDED GAR-FISH, *B. truncata*, is found on our coasts. It is highly prized by epicures.

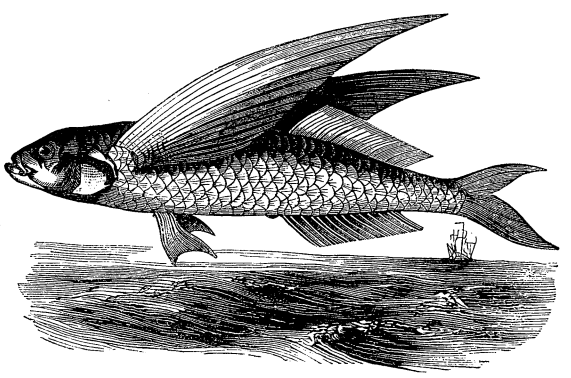
Genus SCOMBERESOX: *Scomberesox.*—To this belongs the SKIPPER or SAURY PIKE, *S. saurus*, from one to two feet long; swims in vast shoals, and when chased by the porpoises leaps to the height of six or seven feet out of water. Sometimes the surface of the sea foams with them; twenty thousand have been seen out of the water at a time. Found in the European seas.



THE SAURY PIKE.

The BILL-FISH, *S. Storeri*, is ten to twelve inches long; is esteemed for the table; abundant on the coast of Newfoundland; rare on our coast.

Genus EXOCÆTUS: *Exocœtus.*—To this belong the *True Flying-Fishes.* The COMMON FLYING-FISH, *E. volitans* of Pennant, is twelve to fourteen inches long, and has the ventral fins placed anterior to the middle part of the body; it may thus be distinguished from the FLYING-GURNARD of the Mediterranean, already noticed, which has the fins placed behind the middle of the body. These fins are also much smaller in the true flying-fishes. The species now under consideration belongs to the Atlantic, and is most common in the tropical portions, though it is occasionally found on the European and American coasts as high as 50° north latitude. They are often seen to leap by hundreds and even thousands from the water, chased by the dorados and bonitos. They have no true power of flight by beating the air and rising upon it with their wings, but only sail along, sustaining and prolonging their course by spreading their wings. They rise into the air by vigorous leaps, often to the height of twenty feet, and sometimes making a course of six hundred feet. Occasionally they have fallen on the decks of ships. There are several other species, two or three on our own coasts.

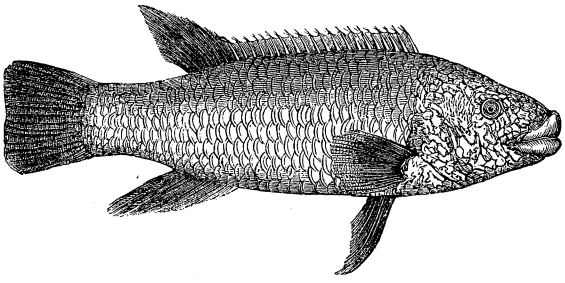


THE FLYING-FISH.

Genus LABRUS: *Labrus.*—This includes several genera, the species of which are widely dis-

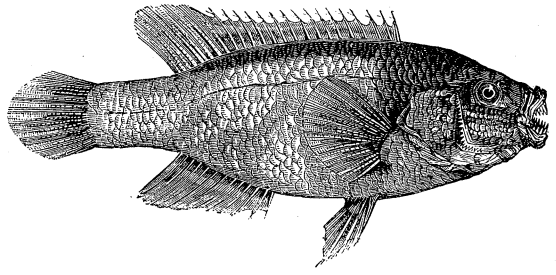
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tributed. They are known by the names of *Wrasse*, *Rock-Fish* and *Old-Wife*. They are generally of a stout form and moderate size, and often of very brilliant colors.



THE WRASSE.

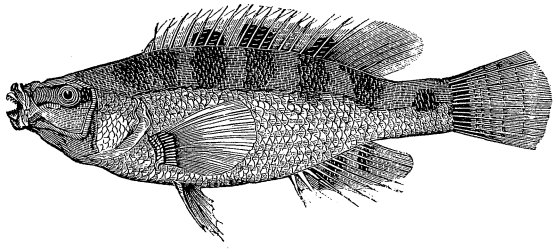
The Ballan Wrasse, *L. maculatus*, one to two feet long, frequents deep gullies and rocks where it shelters itself among sea-weed, and feeds on crabs. Its flesh is not much esteemed. This and several other species, as the Sea-Wife, Red Wrasse, and Rainbow-Wrasse, &c., are common in the European waters.



THE GILT-HEAD.

Genus CRENILABRUS: *Crenilabrus.*—This includes the Gilt-Head or Connor, *C. tinca;* it is six to eight inches long, its general color being red varied with green. It is sometimes called the Golden-Maid. Found in the European seas.

The Goldfinny, *C. Cornubicus*, is two to five inches long; found in Europe, but less abundantly than most other species.



THE GOLDFINNY.

Genus CTENOLABRUS: *Ctenolabrus.*—This includes the Common Bergall, *C. ceruleus*—*Crenilabrus burgall* of Storer—familiarly known on our coast as *Blue-Fish;* at Boston it is called *Blue Perch*, and by Eastern fishermen *Cunner*. It is also sometimes called *Nibbler* and *Chogset*. It is six to twelve inches long, the color generally blue, but varying in different species, sometimes being orange-yellow. It is common on our coast, and its flesh being tolerable, our Northern markets are well supplied with it. The Spotted Bergall, *C. uninotatus*, is three to five inches long.

Genus TAUTOGA: *Tautoga.*—This includes one of the most celebrated of our fishes, the Tautog, *T. Americana*. Its common name is derived from the Mohicans; it is often called *Black-Fish*, being of a bluish-black color; it is six to eighteen inches long, and weighs from two to ten and even, it is said, to twenty pounds. Its haunts are along rocky shores, where it feeds near the ground on small crabs and mollusca. It is a wary fish, bites firmly at the hook, and is tenacious of life when taken from the water. The time for catching these fish is said by Dr. Mitchill to be thus rudely expressed by the people along the coast:

> "When chestnut leaves are big as thumb-nail
> Then bite Black-Fish without fail;
> But when chestnut leaves are long as a span,
> Then catch Black-Fish if you can."

The common bait is the soft-clam. Frank Forester says the best implements for this sport are a stout trolling-rod, with a strong flaxen line and a reel. The hooks should be those known as *Black-Fish hooks*, numbers three to ten, according to the angler's taste. This fish is most abundant on the coasts from Massachusetts to Sandy Hook. Our large city markets are well supplied with it; it is highly esteemed for the table.

Several other species of this genus are found in the Indian Ocean, the Red Sea, and on the coast of Norway. One or two other species are also found on this side of the Atlantic.

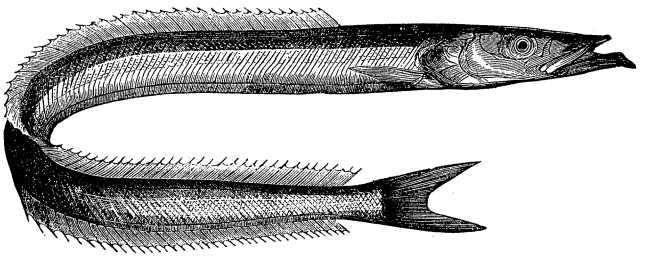
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THE ANACANTHINA.

This term, from the Greek, signifies *without spines*, and is descriptive of the group of fishes we are now to describe. The fins are entirely supported upon soft rays, and there are other structural peculiarities. We shall notice them under four heads, *Ammodytidæ*, *Ophidiidæ*, *Gadidæ*, and *Pleuronectidæ*.

THE AMMODYTIDÆ.

This group includes several species having a naked skin, with a beautiful silvery luster, and a form resembling the eel. They are known by the name of *Sand-Eels*, from their habit of burying themselves five or six inches deep in the sand; they are captured by means of iron hooks and rakes, with which they are drawn out of their retreats.



THE SAND-EEL.

The Common Sand-Eel of Europe, *Ammodytes Tobianus*, is about a foot long. The Sand-Launce, *A. lancea*, is five or six inches long. These are not greatly esteemed for food.

The American Sand-Eel, *A. Americanus*, is six to twelve inches long; the Banded Sand-Launce, *A. vittatus*, is four to six inches long. Both are found on our coasts.

THE OPHIDIIDÆ.

This group has the body slender and elongated, it being sometimes naked and sometimes covered with minute scales imbedded in the skin. They are small fishes inhabiting the sea.

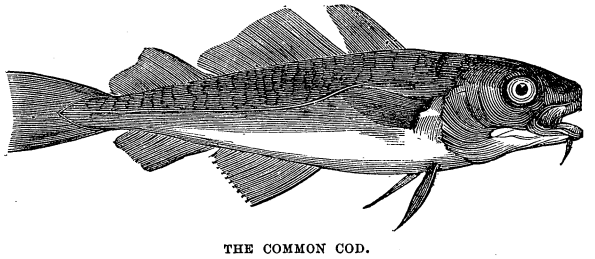


THE OPHIDIUM.

The Beardless Ophidium, *O. imberbe*, is three or four inches long, color purplish-brown; found on the European coasts. The New York Ophidium, *O. marginatum*, is nine inches long; color above ash-gray. It is occasionally taken on our coasts, where it is called *Little Cusk* by the fishermen.

THE GADIDÆ.

This name is derived from the Latin *gadus*, a codfish, this being the type of the family. There are several genera, embracing, it is said, more than sixty species. In general the body is of an elongated spindle-like form, produced behind into a long tail; the skin is usually furnished with very small soft scales, which are entirely inclosed in separate sacs; the median fins are of very large size, and usually divided into several portions; the mouth is wide, furnished with numerous small teeth, and the margin of the upper jaw is entirely formed by the intermaxillary bones. The lower jaw is frequently furnished with a single cirrus, or beard, beneath its extremity, and the nose sometimes bears one or two pairs of similar appendages; the ventral fins, also, are sometimes reduced to a single ray, so as to acquire the appearance, as they no doubt perform the office, of cirri; and these in some species are of considerable length, and give off a branch from about the middle, which is sometimes longer than the main stalk.



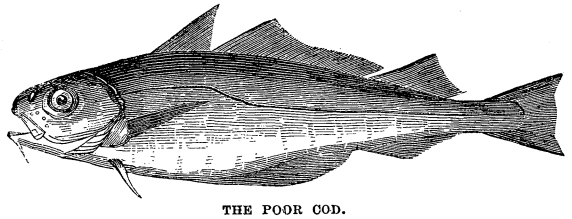
THE COMMON COD.

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The Gadidæ are active and exceedingly voracious fishes, feeding indiscriminately upon almost all the smaller aquatic animals. Yarrell states, that "thirty-five crabs, none less than the size of a half-crown piece, have been taken from the stomach of one cod." They are nearly all marine; their flesh is exceedingly firm and well-flavored; and as many of the species occur in the greatest profusion, their importance in furnishing an abundant supply of agreeable and nutritious food to the human race is almost incalculable. These fishes are all taken by hook and line, baited with common mollusca, such as limpets, whelks, &c., or with pieces of fish. For the deep-sea fishing long lines are used. On the British coasts these are fixed to the bottom by means of a small anchor, the other end being supported by a buoy, and the hooks are placed at the extremities of short lines, usually about six feet in length, attached at intervals to the main line. The long lines are usually left for about six hours, or for a whole tide, when they are taken up and examined. In the interval the fishermen are not idle; they carry on the work of destruction by means of hand-lines, of which each man manages a pair. In this manner an immense quantity of these and other valuable fish are taken on almost all parts of the British coasts. Nor is the pursuit of these important species less actively carried on in our American waters. The greatest cod-fisheries in the world are on the banks of Newfoundland, where large fleets, chiefly of American, English and French vessels, are employed during the season. In spite of the enormous consumption constantly going on, the numbers of these fish do not appear to decrease; and this, perhaps, is the less to be wondered at, when we consider that the roe of a single cod has been found to contain no fewer than nine millions of ova. Their general spawning time appears to be the winter, or very early in the spring; they are full of roe and in the greatest perfection during the early winter months. *Cod-liver oil* has of late years become an important article of commerce, being esteemed a valuable medicine in consumption.

Genus MORRHUA: *Morrhua.*—Of this the most noted and valued species is the COMMON COD OF NEWFOUNDLAND, *M. vulgaris.* It is two to four feet long, and weighs from two to seventy pounds; the general color is greenish-brown above, and silvery-white beneath. It inhabits deep water, and is often taken at the depth of thirty fathoms. It is common in the Northern Atlantic, and is found on the European coasts from Spain to Norway, and on the American side from New York to Greenland. It is abundant on the coasts of the British Islands, and is there taken in immense quantities; but, as we have before stated, the Banks of Newfoundland afford the most abundant supply. The markets of Europe and America are constantly supplied with these fishes in the fresh state, but the greater number are salted and dried, and are distributed to nearly every part of the world. In this country they are sent throughout the vast interior, not merely to the cities and larger towns, but to the villages and settlements on the very frontiers of civilization. In the remote districts, where there is a surfeit of venison, wild turkeys, and grouse, dried codfish rises to the dignity of a cherished luxury; especially do the emigrants from New England, early accustomed to this food but now exiled to the regions of the Far West, sit down to their dish of boiled cod and potatoes, and wonder that they could ever have left the land flowing with such milk and honey as this.

The ROCK-COD, *M. Americana*—the *New York Cod* of De Kay—equals the preceding in size; Dr. Storer mentions one of the immense weight of one hundred and seven pounds. It varies greatly in color, but in general resembles the common cod. It occurs on our coast during the whole year, going to deep water in the spring.



THE POOR COD.

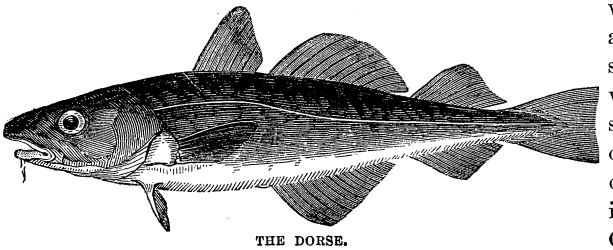
The POOR or POWER COD, *M. minuta*, is four to eight inches long; common in Europe, but rare on our coast.

The TOM-COD, *M. pruinosa*, is four to twelve inches long; found from New York northwardly. It is very abundant in autumn from the time of the first frost, and hence is called *Frost-Fish.*

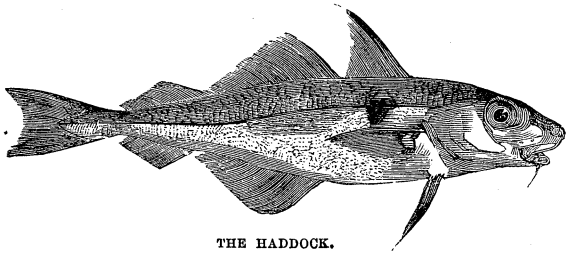
The DORSE or VARIABLE COD, *M. callarias*, is from one to two feet long; varies greatly in color; is common in the Baltic; also found occasionally on the British coasts.

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The Haddock, *M. æglefinus*, is greatly valued for its flesh; it swims in immense shoals, and vast numbers are taken. This, as well as the cod, has been kept in salt preserves in Scotland, and both have thriven well. The haddocks speedily become so tame as to take food from the hand of their keeper. The common weight of the haddock is about two pounds; it is found from this to ten pounds. Common on the Northern European and American coasts.



THE DORSE.

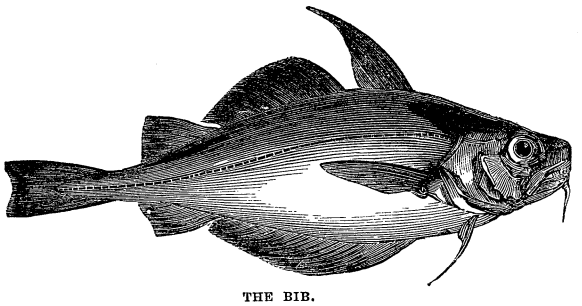


THE HADDOCK.

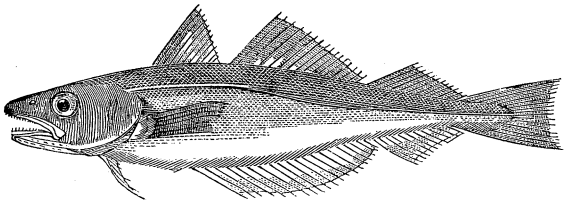
The Bib, *M. lusca*—also called *Pout* and *Whiting-Pout*—is twelve to sixteen inches long, and is found on the Northern European coasts; its flesh is excellent.

The Speckled Cod, *M. punctata*, is eighteen inches long, and is found as the above.

Genus MERLANGUS: *Merlangus.*—To this belongs the Whiting, *M. vulgaris*, well known for the surpassing delicacy and pearly whiteness of its flesh. It is from twelve to twenty inches long, and weighs from one to four pounds. It is common around the British Islands, where it is caught in large quantities at nearly all seasons of the year.

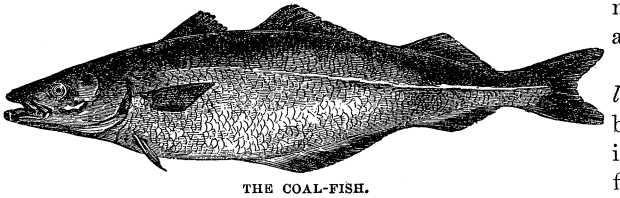


THE BIB.



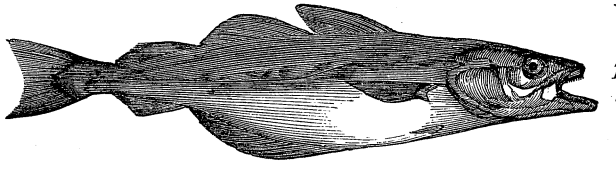
THE WHITING.

The Coal-Fish, *M. carbonarius*, is a large species, weighing from ten to thirty pounds. It swims rapidly, and at no great depth. It is rather coarse food, but is largely consumed by the poor. It is common in all the Northern European seas, and it exists in swarms around the Orkneys; it is also found on our coasts, and is sold in our markets under the names of *Pollack* and *Black Pollack.*



THE COAL-FISH.

The Green Pollack, *M. leptocephalus*, is deep green above, silvery-white beneath; length, twelve to eighteen inches; called *Young Haddock* by our fishermen. Found in our American waters, though rarely taken.



THE POLLACK.

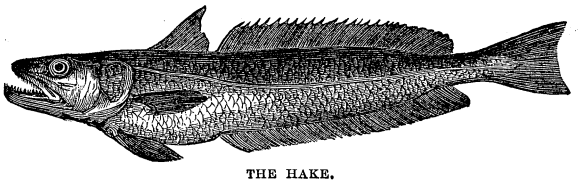
The New York Pollack, *M. purpureus*, is one to two feet long, and is abundant on the coast of Massachusetts.

The Pollack or Whiting-Pollack, *M. pollachius*, is a frolicsome fish, constantly plashing in the water, and biting keenly at the hook; it is twelve to twenty-four

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inches long, and the young resemble the whiting. Common on the European coasts. Hand-line fishing for pollacks is called "*whiffing*."

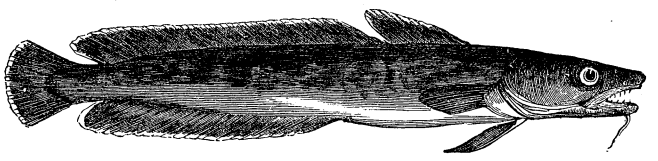
Genus MERLUCIUS: *Merlucius.*—To this belongs the HAKE, *M. vulgaris*, two to three feet long; it is a roving fish, found on all the European coasts, and on the northern shore of the Mediterranean; it is exceedingly voracious, and fourteen pilchards have been found in the stomach of one of ordinary size. They have the trick of the vulture in vomiting up their food when they are attacked and wish to escape. It is a coarse fish, and little valued, though considerable quantities are salted and dried and sent to Spain.



THE HAKE.

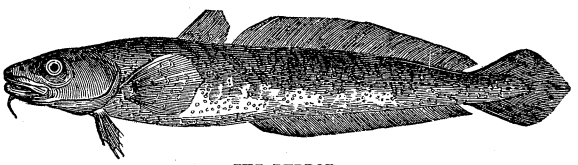
The AMERICAN HAKE, *M. albidus*, is one to two feet long, and is sometimes taken on our coasts. Smith says it is taken off Cape Cod and sold under the name of *Stock-Fish*; the same author says that when prepared for market they are called *Poor-Johns*.

Genus LOTA: *Lota.*—To this belongs the LING, *L. molva*, a valuable fish, taken in large quantities on the British coasts, and salted and dried, chiefly for exportation. The *air-bladders*, popularly called *sounds*, are prepared separately, and with those of the codfish are pickled and sold. The roes, which are of large size, are preserved in brine and used to attract fish. The oil of the liver of this fish is used by the poor of Great Britain for lamps; this and cod-liver oil were formerly in great request as remedies for rheumatism; they were taken in small beer in doses of an ounce to an ounce and a half. This practice has passed away, but cod-liver oil has lately been largely used as a cure for consumption.



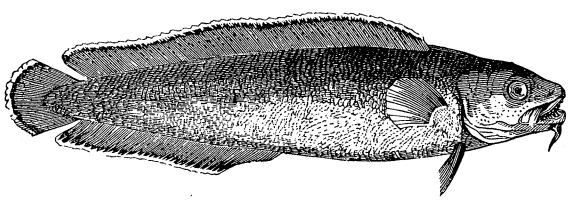
THE LING.

The BURBOT or EELPOUT, *L. vulgaris*, lives in slow-running rivers, is one to two feet long, conceals itself under stones like an eel, and feeds on aquatic insects and young fish. It weighs from one to eight pounds; the flesh is white, soft, and of good flavour; common in Europe.



THE BURBOT.

There are several species on our coast, as the PLAIN BURBOT, *L. inornata*, one to two feet long; the SPOTTED BURBOT, *L. maculosa*, eighteen inches long; the COMPRESSED BURBOT, *L. compressa*, six to eight inches long.



THE TORSK.

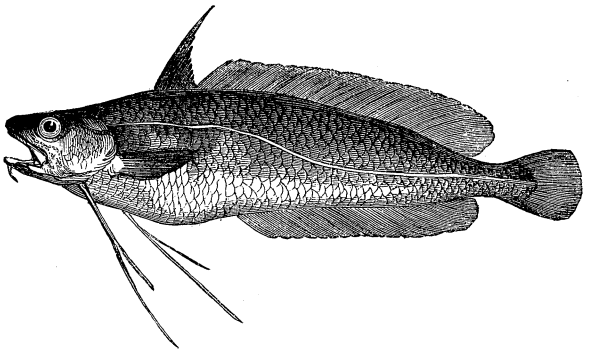
Genus BROSMIUS: *Brosmius.*—This includes the TORSK or TUSK, *B. vulgaris*, one to three feet long; is eaten but not much relished. Found in Europe. The fish called *Cusk* on our coasts closely resembles it.

Genus PHYCIS: *Phycis*, includes the GREAT FORKED-BEARD or FORKED-HAKE, *P. furcatus*, one to two feet long, with a long barbule hanging from each chin. Found around Great Britain, where it is called *Hake's-Dame* by the fishermen. The LESSER FORKED-BEARD, *Raniceps trifurcatus*, is also a European species.

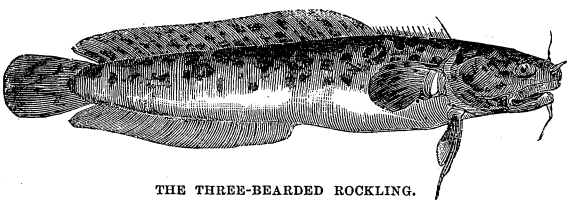
The AMERICAN CODLING, *P. Americanus*—*P. furcatus* of Storer—is one to three feet long; sold in our markets under the name of *Hake* and *Codling*. The SPOTTED CODLING, *P. punctatus*, ten inches long, is a rare species; found from the St. Lawrence to New York.

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Genus MOTELLA: *Motella.*—To this belongs the THREE-BEARDED ROCKLING, *M. vulgaris.* It is twelve to fifteen inches long, frequents rocky ground, feeds on aquatic insects, takes bait, but is not used for food, as the flesh smells unpleasantly in a short period after it is out of the water. Found in Europe. The FIVE-BEARDED ROCKLING, *M. quinquecirrata*, is also a European species.



THE GREAT FORKED-BEARD.



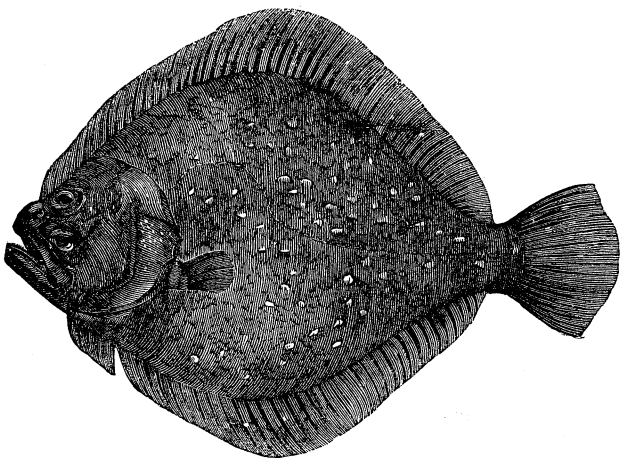
THE THREE-BEARDED ROCKLING.

The MACKEREL MIDGE, *M. glauca*, is a beautiful little fish, an inch and a quarter long; it dies instantly on being taken out of the water. From its minute size and the multitudes in which it appeared, it was formerly thought to be produced by spontaneous generation from the froth of the sea, or the putrifaction of marine substances.

The SILVERY-GADE, *M. argenteola*, is two inches long. This and the preceding species are common in Europe.

THE PLEURONECTIDÆ.

This term, derived from the Greek, *pleuron*, side, and *neko*, to swim, means *fishes that swim on the side*, and is applied to those which are usually called *Flat-fish.* They are very peculiar in their appearance and form. They have a broad, flat body, margined almost throughout by long dorsal and anal fins; the head is singularly twisted, so that the eyes are both brought to one side of the body, and this, which is always uppermost, is usually of a dark color, and frequently spotted, whilst the opposite is always white. These surfaces are often regarded as the back and belly of the fish, but incorrectly; the gill openings and the paired fins being situated on both surfaces, the pectorals a little behind the apertures of the gills, and the ventrals in front of those on the throat. The abdominal cavity is very small, and the anus opens under the throat, so that the whole body is nothing but an exceedingly compressed, disc-like tail. The mouth is small, and armed with small teeth, and in most species the skin is covered with ctenoid scales.



THE TURBOT.

The Flat-fishes swim with the dark side uppermost, and with a sort of undulating motion of the whole body; they generally keep close to the bottom, where they feed upon small fishes, mollusca, worms, crustacea, &c. Some species attain a large size; the Halibut is said sometimes to weigh as much as five hundred pounds; a specimen, measuring seven feet six inches in length, three feet six inches in breadth, and weighing three hundred and twenty pounds, was taken in April, 1828, off the Isle of Man, and sent to the Edinburgh market. The Turbot does not appear

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to reach quite such gigantic dimensions; Yarrell mentions one that weighed one hundred and ninety pounds, and measured six feet across. One is spoken of in the history of Rome as having been taken in the time of the Emperor Domitian, of such huge size that the senate were convoked to decide upon the proper mode of bringing it to the table. Juvenal says,

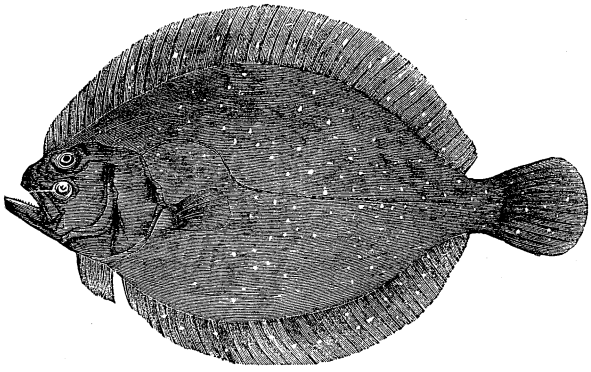
> "No vessel they find fit to hold such a fish,
> And the senate's convoked to decree a new dish."

These fish are caught either by means of hooks and lines or by the trawl-net; the former method is employed during the warmer months of the year. The species most esteemed in England are the *Turbot* and the *Sole*, which are not found in American waters; but several others, although inferior in the quality of their flesh, are of great importance, as they are caught in such numbers that they can be sold at a very cheap rate. Of these the best known are the *Plaice*, the *Brill*, and the *Flounder*.

All the *Pleuronectidæ* are inhabitants of the sea, although they sometimes ascend the brackish waters of tidal rivers; and the Flounder even appears capable of thriving in perfectly fresh water. They are rather voracious fishes; and, in spite of their singular form, are often very active in their habits.

Genus RHOMBUS: *Rhombus—Pleuronectes* of De Kay. To this belongs the Turbot, *R. maximus*, common in European waters, and regarded in England as one of the richest and best of fishes; it feeds on small fish, crustacea, and shell-fish; seeks sandy ground, and is a great wanderer, usually in companies; the common size is five to ten pounds. The English and Dutch fisheries for turbots are very extensive; the season begins in April or May and ceases in August. In the early part of the season the trawl-net is used, which brings up not only turbots, but soles, plaice, thornbacks, &c. When the weather is warm the fishermen resort to the hook and line. The hooks are baited with the common smelt. The value of the turbot annually imported into Great Britain from Holland is said by Yarrell to be four hundred thousand dollars; the Danes are said by the same authority to supply sauce for these fishes at a cost of seventy thousand dollars, this sauce being extracted from a million of lobsters caught on the coast of Norway. These supplies are in addition to the products of the immense fisheries of the British themselves.

It has been stated that a species of turbot has been occasionally taken in Boston harbor, but this does not seem to be well established. Under the generic head of *Pleuronectes* Dr. De Kay mentions a single species, as follows, though denying the existence of the well-known European turbot in the American waters: the Spotted Turbot, *P. maculatus*, twelve to eighteen inches long, called *Watery Flounder* by Dr. Mitchill, and sometimes *Sand-Flounder* among fishermen. It is delicate food, and has been known to weigh twenty pounds.



THE BRILL.

The Brill, *R. vulgaris*, is found from six to twelve pounds, and is taken in large numbers on the British as well as Dutch coasts. It bears the various popular names of *Pearl*, *Kite*, *Brett*, &c. Its flesh is much inferior to that of the turbot.

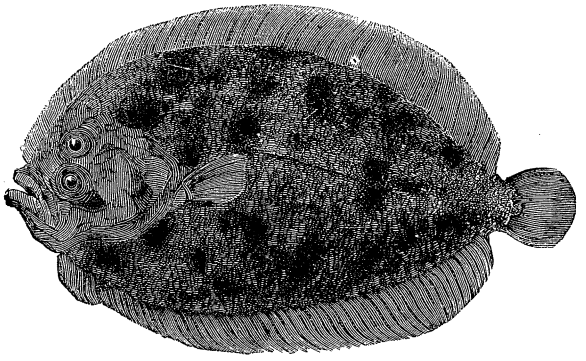
Muller's Topknot, *R. hirtus*, seven or eight inches long, is common on the British coasts.

Bloch's Topknot, *R. punctatus*, is similar to the preceding, though much less abundant.

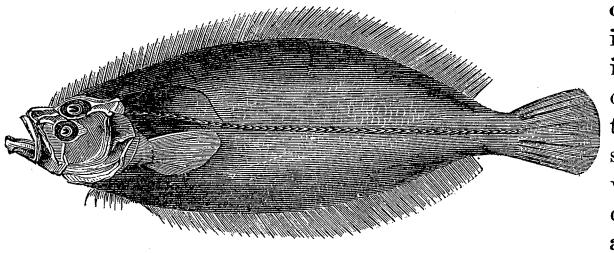
The Whiff, *R. megastoma*, is twelve to twenty-four inches long, and is very thin; it is not greatly esteemed for the table. Common on the British and Dutch coasts, and is called *Carter* by the Cornish fishermen.

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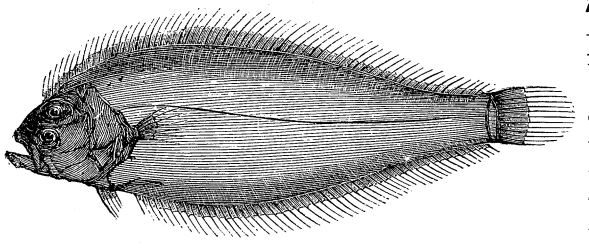
The MEGRIM or SMOOTH SOLE, *R. Arnoglossus*, seldom exceeds four or five inches in length. It is sometimes called *Scald-Fish*. Found as the preceding.



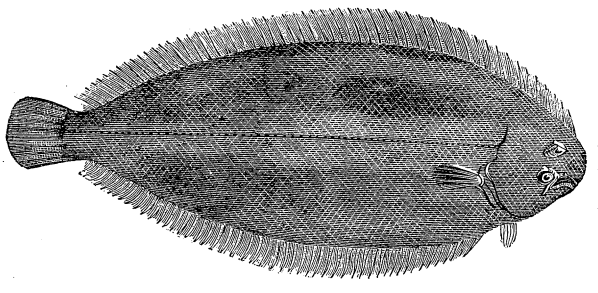
MULLER'S TOPKNOT.



THE WHIFF.



THE SMOOTH SOLE.



THE COMMON SOLE OF EUROPE.

Genus SOLEA: *Solea*, includes the COMMON SOLE OF EUROPE, *S. vulgaris*, ten to twenty-six inches long, and weighing from one to ten pounds; it inhabits sandy shores in deep water, being taken by the trawl-net, and not by the hook. It feeds on testaceous animals, and the spawn and fry of other fishes. It is one of the very best of European fishes, and is taken in great quantities along the coast, especially in the British islands. Eighty-six thousand bushels of soles were received at Billingsgate market, London, in a single year. The fishing-season is from May to November. The principal trawling-ground in England is on the south coast from Sussex to Devonshire. This fish thrives well in fresh water. Found in the European seas; common in the markets of London and Paris.

The FRENCH or LEMON-SOLE, *S. pegusa*, and the VARIEGATED SOLE, *Monochirus linguatulus*, are other European, though rare species.

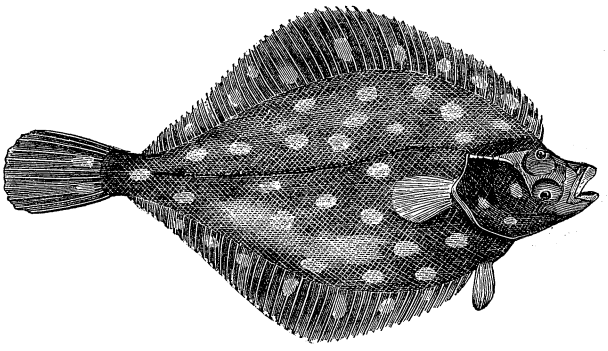
Genus ACHIRUS: *Achirus*, includes the NEW YORK SOLE, *A. mollis*, three to six inches long; common on the coast from Nantucket to Carolina. They are taken on our coasts in September and October, and are delicate food, but are too small to be of any great importance. The Jersey fishermen call them *Calico* and *Coverclip*. They often ascend the Hudson to a distance of forty miles.

Genus PLATESSA: *Platessa*, includes the PLAICE, *P. vulgaris*, weighing six to twelve pounds; it feeds on mollusca, crustacea, and young fish; inhabits sandy banks and muddy grounds in the sea; is sometimes taken with hooks and sometimes with spears, though more generally with trawl-nets. It is highly esteemed as food. It is common on the European coasts, and is sometimes very abundant. Enormous quantities are taken and consumed in Great Britain.

The COMMON FLOUNDER OF EUROPE, *P. flesus*, is found at the mouths of nearly all the European rivers, and is especially abundant where the bottom is soft and muddy. It lives and thrives in salt, fresh, and brackish water; feeds on aquatic insects, worms, and small fishes.

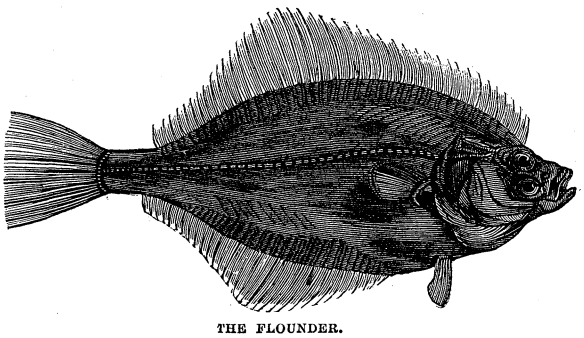
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It weighs from one to three pounds, and is esteemed tolerable food. In England it is called *Butt* and *Flook*.



THE PLAICE.

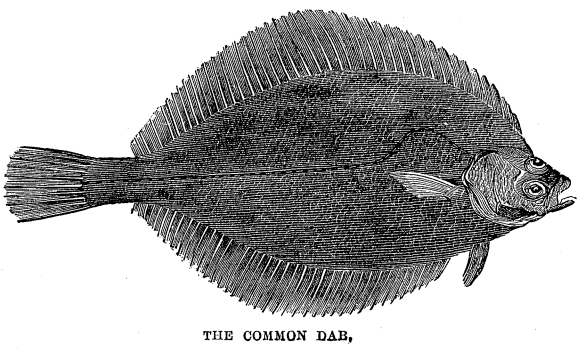
The Common Dab of Europe, *P. limanda*, is eight to twelve inches long; feeds on crustacea, small fish, and marine insects; is often caught with plaice and flounder, but is preferred to either for the table. Found on the European coasts; abundant in the London markets. There are some other species, as the Smooth or Lemon Dab, *P. microcephalus*, called *Sand-Fleuk* in Scotland; and the Long Rough Dab, *P. limandoides*, called *Sand-necker* in Scotland: both found on the European coasts and somewhat rarely in British waters.



THE FLOUNDER.

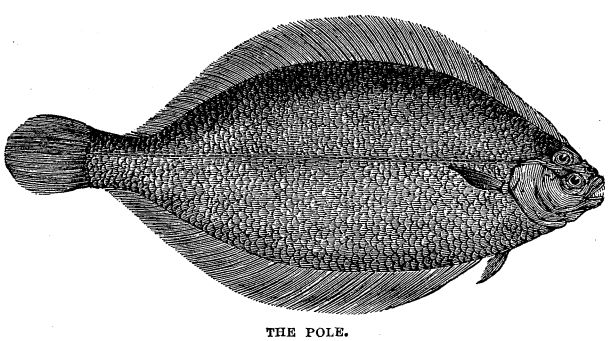
The Pole or Craig Fluke, *P. pola*, is fifteen to twenty inches long; color yellowish-brown; found on the European coasts; rare in England.

There are several species of *Platessa* known on our coasts. The New York Flat-Fish, *P. plana*, is six to eighteen inches long; color variable, but usually pale greenish; highly prized for the table; common in the New York market, where it is sometimes called *Winter-Flounder*.



THE COMMON DAB.

The Pigmy Flat-Fish, *P. pusilla*, is five inches long; is taken on our coasts, but is little valued for food. The Rusty Flat-Fish, *P. ferruginea*, is twelve to twenty inches long; rare; found in deep water. The New York Flounder, *P. dentata*, also called *Toothed Flat-Fish*, is about twenty inches long; is well flavored, and common in our markets under the name of the *Summer-Flounder*. The Spotted or Oblong Flounder, *P. oblonga*, is fifteen to twenty inches long; is common along our sandy shores, and is procured abundantly in September and October. It is excellent food, and like its congeners, is tenacious of life, and can be preserved in good condition for a long time. The Long-toothed Flounder, *P. ocellaris*, is twelve to twenty inches long; its flesh is savory; found on our coasts in the summer months.

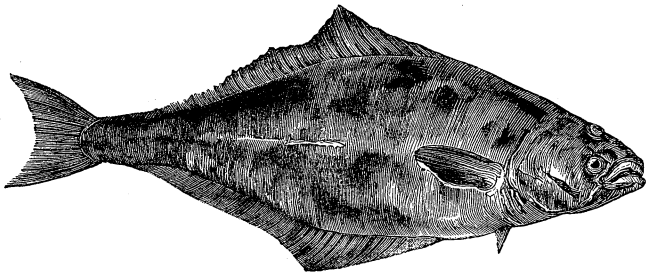


THE POLE.

Genus HIPPOGLOSSUS: *Hippoglossus*, includes the Halibut, *H. vulgaris*. This is a large

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species, sometimes measuring seven or eight feet in length, and weighing five or six hundred pounds. It feeds close to the ground on other flat-fish and various crustacea. It is abundant in the northern seas on both sides of the Atlantic; the flesh is firm but dry, and has little flavor; the head and fins are the best parts. This fish is common in the markets of Boston, New York, &c. The Greenlanders eat it both fresh and dried; the inhabitants of the Orkneys obtain from it a large quantity of oil.



THE HALIBUT.

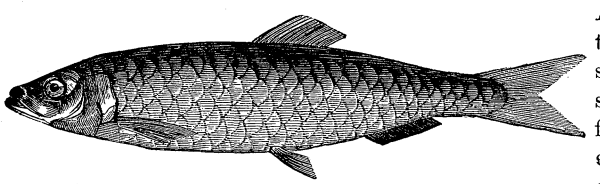
THE PHYSOSTOMATA.

We now come to the last, but still a very extensive division of Teleostea. The term *Physostomata* is compounded of the Greek *phusa*, a bladder, and *stoma*, the mouth, and alludes to an important and distinguishing characteristic, which is, that in all the species the air-bladder is connected with the pharynx by a sort of duct. Most of the group are furnished with a complete series of fins, which are always entirely composed of soft rays, with the exception of the first ray in the dorsal, anal, and pectoral fins, which are sometimes spinous. The ventral fins are sometimes wanting; when present, they are always abdominal in position—that is to say, they are situated on the ventral region, behind the pectorals. There is never more than one rayed dorsal fin; but behind this there is occasionally a second adipose fin. The skin is sometimes naked, and sometimes more or less covered with bony plates; in most cases, however, it is thickly clothed with scales, which always exhibit the cycloid character. The species are exceedingly numerous, and inhabit both salt and fresh waters. They include among them some of the most important of the fishes that are sought for by man as food, and also the only species of this order which possess electrical powers. We shall describe them under the following heads: the *Clupeidæ*, *Scopelidæ*, *Salmonidæ*, *Galaxiidæ*, *Esocidæ*, *Mormyridæ*, *Cyprinidæ*, *Pœciliidæ*, *Characinidæ*, *Siluridæ*, *Loricariidæ*, *Amblyopsidæ*, *Murœnidæ*, *Gymnotidæ*, and *Symbranchidæ*. The three last embrace various kinds of Eels, and are called *Apodal* or *Footless Fishes*, as they have no ventral fins; the others are called *Abdominal Fishes*, as their ventral fins are placed on the belly behind the pectorals.

THE CLUPEIDÆ.

The fishes of this family are all covered with large thin scales; the mouth is wide, the dorsal fin large, and there is no adipose fin. It includes some of the most important of all fishes in an economical point of view.

Genus CLUPEA: *Clupea*, includes the HERRING, *C. harengus*, abundant in European and American waters. It is twelve or thirteen inches long; feeds on various small fishes, including young herrings; spawns near the first of November; the fishing-season begins two or three months earlier, drift-nets being used by the fishermen.



THE HERRING.

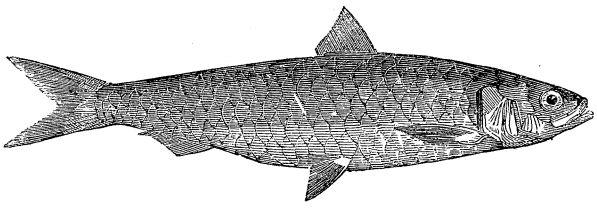
From the statements of several observers, it appears that the Herrings inhabit the European as well as the American seas at all seasons, keeping in deep water during the winter and spring months, and that the appearance of the vast shoals at particular epochs, which has given rise to the idea of their performing long migrations, is due only to their seeking the shallow waters for the deposition of their spawn. During their migrations for this purpose they swim close to the surface of the water, and so

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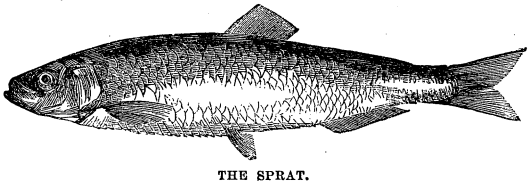
enormous are the crowds of fish which thus, animated by a common impulse, swim together in the same direction, that the sea for miles exhibits a silvery appearance, from the glittering of their brilliant scales. The principal seat of the herring-fishery of Great Britain is at Yarmouth, but it is carried on at many other points along the coast. Whole fleets are engaged in this business during the season. It appears that about four hundred thousand barrels are annually taken and cured; if we allow one thousand to a barrel, we shall have four hundred millions of herrings annually taken by the British fishermen. The American herring-fisheries* are chiefly carried on along the New England coasts, and those of the British provinces. They are of very great extent, though less than those of Great Britain. Herrings are commonly taken at night by torch-light.

Besides the preceding, there are several other species of Herring, some of which are common on our coast. Among them is the Brit, *C. minima*, one to four inches long, at some seasons appearing in incredible numbers on the coast of Massachusetts.

The Pilchard, *C. pilchardus*, is eight to eleven inches long; it resembles the herring, but is smaller, and at the same time thicker. It is common on the European coasts, and is taken in immense numbers by the British. Though less valued than the herring, they are still always in request, especially for shipment to Spain and the Mediterranean. They are taken more or less at all seasons, but the proper fishing-season begins in August and continues till November. They are caught by drift-nets and seines, and chiefly at night. The skill and enterprise displayed by the fishermen in this, as well, indeed, as in all other large fisheries, may well excite admiration. No less than ten thousand persons are engaged in the pilchard fisheries of Great Britain; the cost of the boats, drift-nets, seines, &c., is two millions of dollars; a seine and its outfit cost two thousand dollars. Ten thousand hogsheads, containing twenty-five millions of pilchards, have been landed at one port in a single day! Sixty millions is supposed to be about the average number annually taken in Great Britain.



THE PILCHARD.



THE SPRAT.

The Sprat, *C. sprattus*, is six inches long, and inferior to the herring in flavor; still immense numbers of it are taken along the European coasts. The fishing for them continues through the winter months, and four hundred British boats are engaged in it. Sometimes the sprats are so abundant as to be used for manuring land, and they have often been sold as low as sixpence a bushel.

The Whitebait, *C. alba*, is a small fish abundant in the River Thames, and greatly valued by the epicures of London. It is a common practice among the citizens of that metropolis, com-

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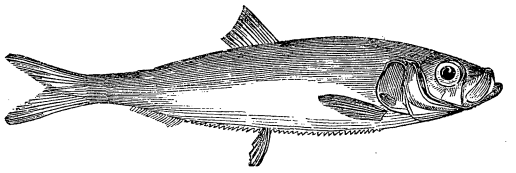
* The following statistics in relation to our American fisheries are extracted from the United States census for 1850:

	Capital employed.	Annual product.
Connecticut	$1,986,300	$1,734,483
Maine	496,910	569,876
Massachusetts	5,582,650	6,606,849
New York	482,100	484,345
North Carolina	235,115	250,025

The interests of the other states in fisheries are comparatively trifling. The whole investment of the United States in fisheries is set down at $8,966,044; the annual product, $10,000,182. The number of "white fish," that is, menhaden, &c., &c., taken by Connecticut in a year is 36,946,000; of shad, 243,448 barrels; and of other fish, 825 barrels; 70,357 barrels whale oil, 3,240 barrels of sperm oil, and 271 tons of bone. Maine takes in a year, 173,094 quintals codfish; 29,685 boxes herring; 12,681 barrels mackerel; and 2,156 barrels of oil. Massachusetts takes 215,270 quintals codfish; 236,468 barrels mackerel; 1,250 barrels herring; 187,157 barrels oil and bone. New York takes 25,283,000 fish of various kinds. The whole number of vessels engaged in the fisheries is 547.

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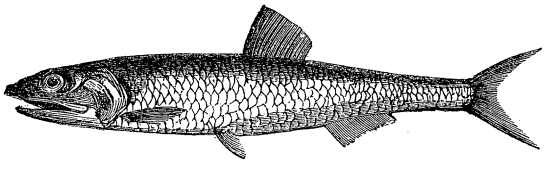
mended, indeed, by the example of the Lord Mayor, cabinet ministers, and philosophers of the Royal Society, to go down to Greenwich or Blackwall, to enjoy the luxury of a meal of "Whitebait."



THE WHITEBAIT.

The SARDINE, *C. sardina*, seems to take the place of the herring in the Mediterranean, though it is less than half its size. It is highly prized for its flavor, and the fisheries there are extensive, though they have fallen off of late years. This fish is also abundant on the coast of Brittany, in France.

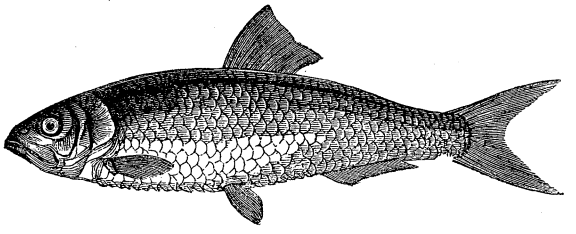
Genus ENGRAULIS: *Engraulis*, includes the ANCHOVY, *E. encrasicolus*, a small silvery fish, four or five inches long; it is taken in vast numbers in the Mediterranean, where it is used for preparing a well-known sauce, which is sent all over the world.



THE ANCHOVY.

Genus ALOSA: *Alosa.*—This includes the ALLICE SHAD, *A. communis*, two feet long, of good flavor, and bearing a close resemblance, as well in appearance as in habits, to our shad. It is somewhat rare in England, but is seen in the markets of London and also those of Paris, but more commonly in those of the Dutch cities.

The TWAITE SHAD, *A. finta*, is twelve or thirteen inches long; the flesh is dry and tasteless; nevertheless it is somewhat extensively eaten. Both this and the preceding were more abundant in England formerly than they are at the present time.



THE TWAITE SHAD.

The AMERICAN SHAD, *A. præstabilis*, is one of the most abundant of our American fishes, and is held by many authorities, among them Frank Forester, as "the most delicate of existing fishes," though its numerous sharp bones are an admitted drawback. It is from one to two feet long, appears along our coasts in the spring, and entering the rivers, ascends them for the purpose of depositing its spawn along the banks. At this season they are caught in large numbers by nets. They will also take the hook baited with a gaudy fly, and afford good sport to the fisher. Those of the New England rivers are deemed the best, those of the Connecticut taking the first rank. They are eaten fresh, and are also extensively put down in barrels. When this country was first settled they were more abundant than at present, and afforded the natives a large part of their subsistence. At that period the salmon was very abundant in the Northern rivers, and less esteemed than the shad; it was therefore customary for the fishermen, who caught both kinds in their seines, to require the people who came down from the country to buy shad, to take a certain portion of salmon.

The AMERICAN ALEWIVE, *A. tyrannus*, is eight to ten inches long, appears like a small shad, and was formerly held in New England to be the young of that fish. It is taken in considerable numbers with the shad, and has similar habits; it is put down in barrels, and commands a good price.

The MENHADEN, *A. menhaden*—also called *Mossbonker*, *Hard-Head*, *Bony-Fish*, and *Skippang*—is ten to fourteen inches long. It is dry and full of bones, and is not eaten, but on the Long Island and Connecticut shores, where it is taken in vast quantities, is used for manure. When planted in the hills of Indian corn, the crop is doubled; it is very remarkable also in regenerating old and worn-out grass lands. Eighty-four thousand of these fish have been caught at a single haul. In Massachusetts they are used as bait for mackerel, cod, halibut, &c.

The MATTOWACCA, *A. mattowacca*—sometimes called *Staten Island Herring*—is one to two

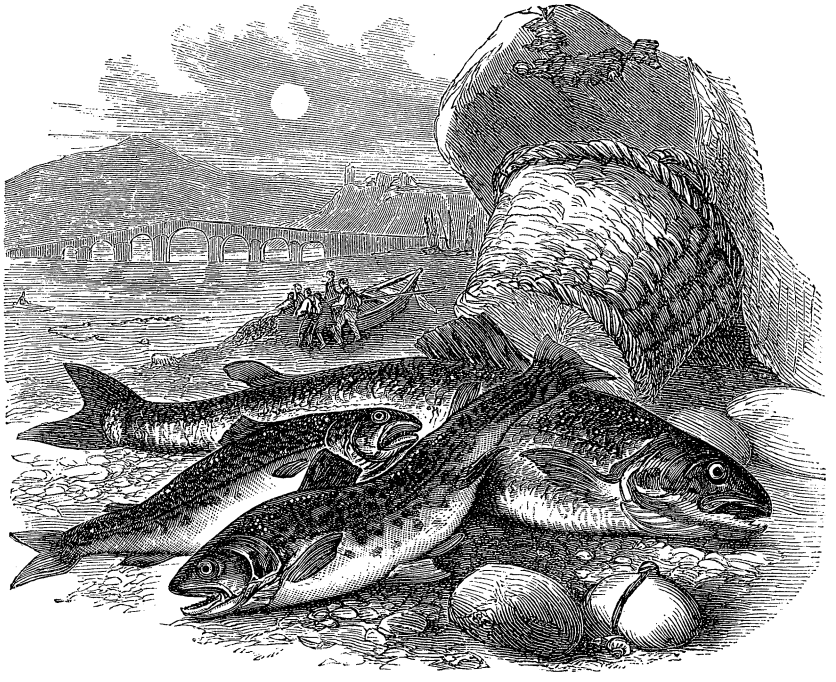
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feet long, and is brought to New York market in the autumn, where it is called *Autumnal Herring*. It is sometimes caught in Connecticut river, where it is called *Weesick*.

The Spotted Shadine, *A. sadina*, is six to twelve inches long, and is found, though not abundantly, on the New York coast.

THE SCOPELIDÆ.

These present considerable resemblance to the salmons, differing, however, in the structure of the upper jaw, of which the biting edge is entirely composed of the intermaxillary bones. They are sometimes naked and sometimes covered with large brilliant scales. They are principally found in salt water; a few occur in the Mediterranean, but most inhabit the tropical seas. Some, as the *Sternoptyx*, present very singular forms.



SALMON AND TROUT.

THE SALMONIDÆ.

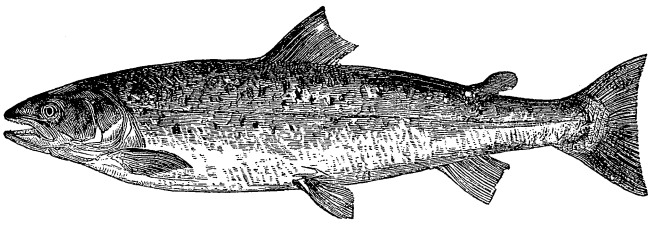
The members of this great family furnish some of the most celebrated fishes, whether regarded as game for the sportman or food for the epicure. They are generally inhabitants of the fresh waters of the northern parts of the world, a few only, like the salmon, passing a portion of their existence in the sea, and ascending into the rivers in the spawning season. They are exceedingly active and voracious fishes, generally of a slender form and adorned with brilliant colors, or elegantly spotted. They are usually of small or moderate size.

Genus SALMO: *Salmo*, includes the Salmon, the hero of the angler, the idol of the cook, the god of the epicure. There is but one true Salmon, *S. salar*, him of whom Izaak Walton discourseth so learnedly, and on whom he bestoweth the title of "King;" and of whom Frank Forester writes so eloquently. He is an inhabitant of the sea, and is known as well on the western as the eastern shores of the Atlantic.

The salmon is two to four feet long, and weighs ten to twelve pounds, though it has been taken of eighty and even a hundred pounds. The form is long and oval, the scales moderately thin, oval, and rather easily detached; the teeth numerous, sharp, and incurved; branchial rays twelve, color above bluish-black, tinged with gray; beneath silvery white. It is altogether a beautiful fish, elegant in form and model, and brilliant in coloring.

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As we have said, the sea is the home of the salmon, and the North Atlantic his ordinary range, but in spring he enters the estuaries of our rivers, where he gathers in great multitudes, and remains for some weeks, ascending and descending with the ebb and flow of the tide. At this period they are taken in large numbers in our northern streams, especially in the Penobscot, and even farther east, and being packed in ice are sent to various distant markets. In July and August on this continent, but three months later in Europe, they enter the fresh water, and begin to make their ascent for the purpose of spawning. At this period they are in their highest beauty and perfection. In order to insure the hatching of the spawn of this class of fishes, it is necessary that the water should be aërated, or highly charged with oxygen. A powerful instinct teaches them to ascend up the rivers where the water is broken by currents and rapids, and to which, by mingling with the atmosphere, purity and vitality have been imparted. There may be, and doubtless are, other objects in the economy of nature to be attained by this wonderful provision. In these remote and solitary places, away from the crowded thoroughfares of crabs, lobsters, clams, oysters, and swimming fishes of every form and hue, all greedy of spoil, their eggs may have some chance of remaining to be hatched. Nay, there is even a profounder wisdom behind this instinct of the salmon and its kindred, for by means of it the inland country along the borders of the great rivers, and the hills and slopes and even the mountains, threaded by a thousand rills, far up and away from the salt sea, are provided with a never-ceasing supply of the daintiest of food for man, bird, and beast, and that without plowing or planting.



THE SALMON.

To the salmon this instinct is imparted in a degree suited to the energy and daring of its character. In seeking to reach the small streams near the sources of rivers, it dashes up swift currents, shoots over waterfalls, leaps dams, and in fact surmounts barriers which might seem impassable. In these efforts it sometimes makes a clear leap of fourteen feet. If unsuccessful, it tries again and again; one has been known to repeat its leaps for twenty times, at intervals of about two minutes: instances are on record in which these creatures have been dashed on the rocks and killed by the cataracts while attempting to scale them.

When at last arrived at the place of spawning, a pair of these fishes are seen to make a furrow by working up the gravel with their noses, rather against the stream, for a salmon, as well as every other fish, is incapable of working with his head down stream, for the water thus going to his gills the wrong way, drowns him. When the furrow is made the male and female retire to a little distance, one to the one side and the other to the other side of the furrow; they then throw themselves on their sides, again come together, and rubbing against each other, both shed their spawn into the furrow at the same time. This process is not completed at once; it requires eight to twelve days for them to lay all their spawn. When they have done, they betake themselves to the streams and descend to the sea, usually remaining several weeks in the brackish waters, as they did before ascending.

Such are the general habits of these curious and interesting fishes. Many of them reach the lakes which are the sources of the rivers they ascend, and here some of them remain and breed. They pass up the St. Lawrence into Lake Ontario, and even in some instances into Seneca and Cayuga Lakes. Similar instances occur in other localities, as well in America as Europe. No water is too remote for them if there is a stream which leads to it. At various periods the salmon undergoes considerable changes, and names significant of these conditions are applied. The young of the first year is called *Pink*, of the second, *Smolt*, of the second autumn, *Pearl* or *Grisle*. After the spawning both male and female are lean, lank, and unfit for food; at this time the former is called a *Kipper*, and the latter a *Baggit;* both are denominated *Kelts*.

It is as a game fish that the salmon has attained that celebrity which ranks it with the wild

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boar and the fox, as a creature above utility, and made specially for sport. It is to all intents and purposes a fish of prey; to this end every part of its frame is adapted by the master hand of nature. "The elongated form of his body," says Herbert, "tapering forward and aft with the most gradually curvated lines, like the entrance and the van of some swift-sailing barque, enables him to glide through the swift water in which he loves to dwell, displacing its particles with the least resistance; the powerful muscles and strong branched rays of his broad and vigorous caudal fin serve as a propeller, by which he can command an immense degree of momentum and velocity, and ascend the sharpest rapids. No one who has felt the arrowy rush of a fifteen pound salmon, when struck with the barbed steel, will be inclined to undervalue his strength, his speed, or his agility; and the numerous and astonishing leaps which he is capable of making, to the height of many feet above the surface, either in attempting to rid himself of his hook, or in surmounting obstacles to his upward passage in the shape of dams, flood-gates, or cataracts, prove the exceeding elasticity, vigor, and strength of his muscular system.

"The prodigious power of sinew exhibited in the lithe and springy limbs of the quadrupeds of prey of the feline order, is not superior in its degree to that possessed by this, the veritable monarch of the fresh-water fishes; nor are the curved fangs and retractile talons more efficacious instruments to the lion and the tiger for the seizure of their victims than are the fine rows of sharp hooked teeth with which the whole mouth of the salmon is bristled for the prehension and detention of his slippery and active prey."

One of the greatest charms of field-sports consists in breathing the fresh air amid the wilder scenes of nature. In this respect fishing, especially river-fishing, has even the advantage of shooting and hunting, for it not only leads the sportsman amid the most picturesque scenery, consisting of wood and water in every beautiful and fantastic combination of color, grouping, and movement, but it allows, by its tranquil pauses, the soul to drink deep of the spirit of beauty ever haunting such places. Izaak Walton understood all this, and Herbert graces his vivid descriptions of the more active experiences of the fisherman with poetic lights and shadows, indicating an appreciation of the emotions to which we allude. We shall take the liberty to quote a passage from his Jasper St. Aubyn, which affords an admirable picture of salmon-fishing as exercised in the highest style of the craft:

"All nature was alive and joyous; the air was vocal with the piping melody of blackbirds and thrushes, caroling in every brake and bosky dingle. . . . . The shadowy mists of the faint morning twilight had not been dispersed from the lower regions, and were suspended still in the middle air in broad, fleecy masses, though melting rapidly away in the increasing warmth and brightness of the day. A still faint blue line hovered over the bed of the long rocky gorge which divided the chasm from the open country, floating about like the steam of a seething cauldron, and rising here and there into tall, smoke-like columns, probably where some steeper culvert of the mountain stream sent its foam skyward. . . . .

"Once at the water's edge, the young man's tackle was speedily made ready, and in a few minutes his long line went whistling through the air, as he wielded the powerful two-handed rod as easily as if it had been a stripling's reed, and the large gaudy peacock-fly alighted on the wheeling eddies, at the tail of a long arrowy shoot, as gently as if it had settled from too long a flight. Delicately, deftly, it was made to dance and skim the clear, brown surface until it had crossed the pool and neared the hither bank; then again, agreeable to the pliant wrist, it arose on glittering wing, circled half round the angler's head, and was sent fifteen yards along, straight as a wild bee's flight, into a little mimic whirlpool—scarcely larger than the hat of the skilful fisherman—which spun round and round just to leeward of a gray ledge of limestone.

"Scarce had it reached its mark before the water broke all around it, and the gay deceit vanished; the heavy swirl of the surface as the break was closing, indicated the great size of the fish which had risen. Just as the wave was subsiding, and the forked tail of the monarch of the stream was half seen as he descended, that indescribable but well-known turn of the angler's wrist fixed the barbed hook, and taught the scaly victim the nature of the prey he had gorged so easily.

"With a wild bound he threw himself three feet out of the water, showing his silver sides, with

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the sea-lice yet clinging to his scales, a fresh sea-run fish of fifteen, ay, eighteen pounds, and perhaps over.

"On his broad back he strikes the water, but not as he meant the tightened line; for, as he leaped, the practiced hand had lowered the rod's tip, so that it fell in a loose bight below him. Again, again, again, and yet a fourth time he bounded into the air with desperate and vigorous soubresauts, like an unbroken steed that would dismount his rider, lashing the eddies of the dark stream into bright bubbling streaks, and making the heart of his captor beat high with anticipation of the desperate struggle that should follow, before the monster should lie panting and exhausted on the yellow sand or moist greensward.

"Away, with the rush of an eagle through the air, he is gone like an arrow down the rapids; how the reel rings, and the line whistles from the swift-working wheel; he is too swift, too headstrong to be checked as yet; tenfold the strength of that slender tackle might not control him in his first fiery rush.

"But Jasper, although young in years was old in the art, and skilful as the craftiest of the gentle craftsmen. He gives him the butt of his rod steadily, trying the strength of his tackle with a delicate, gentle finger, giving him line at every rush, yet firmly, cautiously feeling his mouth all the while, and moderating his speed even while he yields to his fury.

"Meanwhile, with the eye of intuition and the nerve of iron, he bounds along the difficult shore; he leaps from rock to rock, alighting on their slippery tops with the firm agility of the rope-dancer; he splashes knee-deep through the slippery shallows, keeping his line ever taut, inclining his rod over his shoulder, bearing on his fish ever with a killing pull, steering him clear of every rock or stump against which he would fain smash the tackle, and landing him at length in a fine, roomy, open pool at the foot of a long stretch of white and foamy rapids, down which he had just piloted him, with the eye of faith and the foot of instinct.

"And now the great salmon has turned sulky; like a piece of lead he has sunk to the bottom of the deep, black pool, and lies on the gravel bottom in the sullenness of despair.

"Jasper stooped, gathered up in his left hand a heavy pebble, and pitched it into the pool, as nearly as he could guess to the whereabout of his game—another, and another!—aha! that last has roused him; again he throws himself clear out of water; and again foiled in his attempt to smash the tackle, dashes away down the stream impetuous.

"But his strength is departing; the vigor of his rush is broken. The angler gives him the butt abundantly, strains on him with a heavier pull, yet ever yields a little as he exerts his failing powers; see, his broad silver side has thrice turned up, even to the surface, and though each time he has recovered himself, each time it has been with a heavier and more sickly motion.

"Brave fellow! his last race is run—his last spring sprung; no more shall he disport himself in the bright reaches of the Tamar; no more shall the Naiads wreathe his clear silver scales with river greens and flowery rushes.

"The cruel gaff is in his side; his cold blood stains the eddies for a moment; he flaps out his death-pang on the hard limestone.

"Who-whoop! a nineteen-pounder!"

While, as we have said, there is but one *True Salmon*, there are several other species analogous to it, especially in the rivers that empty into the Arctic seas, and those which flow into the Pacific from the northwest coast. Richardson describes eight or ten such species, as the *Quinnat*, *Queachts*, *Quannich*, *Ekewan*, *Tsuppitch*, &c., of various sizes and qualities, the first of which, abounding in the Columbia, appears greatly to resemble the *Salmo salar*. These fishes are a great resource to the Indians, who, it is said, gather them in vast numbers in this region during the fishing season, they and their horses and dogs feeding on them and growing fat to repletion. Similar species of various kinds doubtless exist in the waters of Kamschatka and the rivers of Siberia.

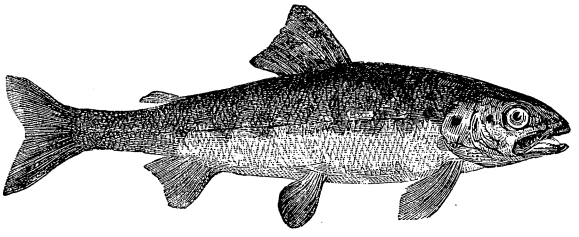
The Mackinaw Salmon, *S. amethystus*—also called the *Great Lake Trout*, and *Namaycush* by the Indians—is two to five feet long, and is the largest of the known salmonidæ, sometimes weighing one hundred and twenty pounds. It is very voracious, and feeds on every fish within its reach. It is speared by the Indians by torch-light; its flesh is reddish, and is

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eaten, sometimes in a frozen state, by the Canadian voyagers. It is found in the Great Lakes of the Northwest from Huron to 68° north, and never visits the sea.

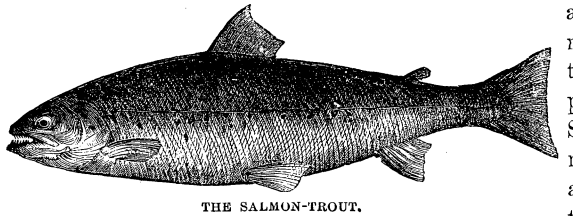
The Siskawitz, *S. Siskawitz*, is somewhat shorter and stouter than the preceding, and rather smaller in size. It is found in Lake Superior, and less abundantly in Lake Huron. It is taken at night with the torch and spear, and also by the seine. It ranks high among the delicacies of the table. It is sometimes called Northern Lake Trout.

The Parr or Samlet, *S. salmulus*, is found in European waters, and being marked on the back by transverse dusky bars very similar to those of young salmon, has been held by many persons to be young salmon in fact. Yarrell opposes this opinion, and we think by effective arguments. It appears that the markings which have given to the Parr the popular names of *Brandling* and *Fingerling* are common to the young of all the species of this genus for a time, but are obliterated by degrees. The Samlets spawn through the month of December. They frequent the trout-streams, and take any bait with freedom at all seasons. They are from six to eight inches long, and are abundant in Great Britain.



THE PARR.

The Salmon-Trout, *S. trutta*, is one of the fishes that migrate from the sea to fresh waters, and takes rank next the salmon; the common weight is two to four pounds, but they sometimes weigh twelve to seventeen pounds. They are very abundant in the Scotch rivers, where they are taken with nets, sometimes two hundred at a haul, and with the hook, one man sometimes taking thirty in a day. They feed on flies, beetles, insects, &c., and are common to Europe and the waters around the Gulf of St. Lawrence in North America.

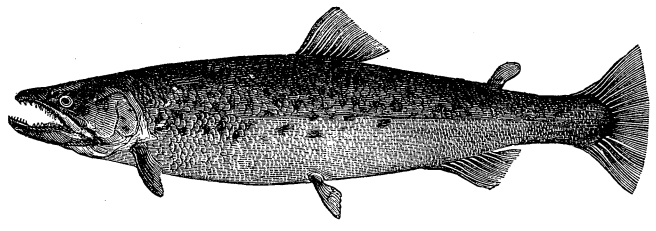


THE SALMON-TROUT.

The Common European Trout, *S. fario*, is hardly less celebrated among sportsmen of the rod, than the salmon. It is ten to thirty inches long, the average being about fifteen; the weight is one to twenty pounds; in form and color it is exceedingly beautiful. It is an inhabitant of rivers and lakes, and is a voracious feeder, but is cautious, vigilant and active, and calls into exercise the utmost skill of the angler. During the day the large-sized fish move but little from their haunts, but toward evening, and during the night, they rove about in search of small fish, insects, and larvæ. The season of spawning is usually in October.

The Great Gray Trout, *S. ferox*, sometimes called the *Great Lake Trout*, is found in England and Ireland, and especially in Scotland, where it is confined to the lakes, never descending to the sea. It is taken with strong hooks and lines, being a very powerful fish. It weighs from two to fifty pounds; the flesh is not greatly esteemed.

The Bull-Trout, *S. eriox*, sometimes called the *Gray Trout* or *Whitling*, is a European species, resembling the common salmon in habits and appearance, and weighing from six to twenty pounds. The flesh is not much esteemed, but it affords good sport for fishermen.



THE BULL-TROUT.

The American Brook-Trout, *S. fontinalis*, closely resembles the common European trout in appearance, size, habits, and qualities, but is still a distinct species. It is widely distributed,

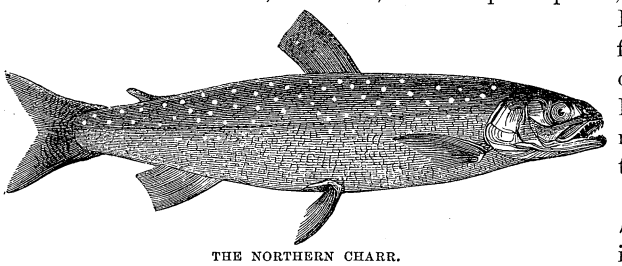
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being found in nearly all the clear running streams of the United States north of Virginia, and is familiarly known to all American masters of the rod. There are many other varieties, passing by the name of *Silver Trout*, *Black Trout*, *Sea Trout*, *Hucho Trout*, &c.; all, however, are of the same species. The diversities in the appearance of these fish, are mostly confined to color, and are caused by the different qualities of the streams in which they are bred.

The RED-BELLIED TROUT—*S. erythrogaster* of De Kay—resembles the preceding, and is probably only a variety of it; found in the lakes of Western New York.

The LAKE-TROUT, *S. confinis*, is two to four feet long, and is common in Lake Ontario and the lakes of Western New York and Northern New England. It bears the popular names of *Lake-Salmon* and *Salmon-Trout;* it is caught in considerable numbers, and in some places is so abundant, that one man has taken, with the hook, five hundred pounds in a week. Cured in salt, it is sold in the Atlantic markets; it is also brought fresh to the city of New York. The flesh is generally of secondary rank; in some of the smaller New York lakes it is said to be excellent.

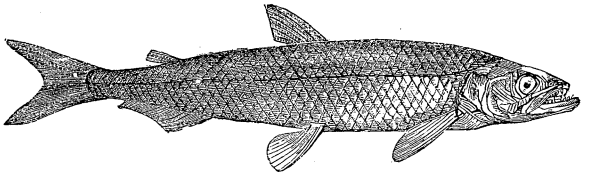
The NORTHERN CHARR, *S. umbla*, is a European species, and inhabits the northern lakes of England and those of Scotland; it is from one to two feet long, and is usually caught by hooks trailing after a boat. It is believed to feed principally at night. There is another species called the WELSH CHARR, *S. salvelinus*.



THE NORTHERN CHARR.

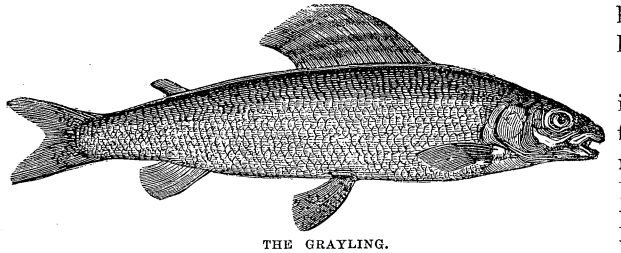
The MASAMACUSH or HOOD'S CHARR, *S. Hoodii*, weighs two to eight pounds, is red fleshed, and of delicious flavor; found in the Mingan River, which empties into the estuary of the St. Lawrence, about latitude 50°.

Genus OSMERUS: *Osmerus*, includes the SMELT, *O. eperlanus*, common in Europe, called *Spirling* and *Sparling* in Scotland; it inhabits the rivers the greater part of the year, that is, from August to May. It spawns about March or April, and soon after visits the sea for about three months. It is extensively taken in nets, and is in great request on account of its peculiar flavor. It can be propagated in fresh water ponds, and do not suffer by the freezing of the water. The average length is seven inches.



THE SMELT.

The AMERICAN SMELT, *O. viridescens*, is greenish above, silvery below; length six to twelve inches. De Kay says its popular name is derived from its smell, resembling that of cucumbers. It abounds in streams connected with the sea, from the Hudson to Labrador. It appears to migrate along the coast, from north to south, in November and December. The New York market is chiefly supplied from the creeks emptying into Long Island Sound, and from the Hackensack and Passaic Rivers in New Jersey. Many are also brought from Massachusetts. They are taken with hand-nets, but bite well at the hook. Multitudes are caught in winter, through holes cut in the ice, as well by nets as hooks.



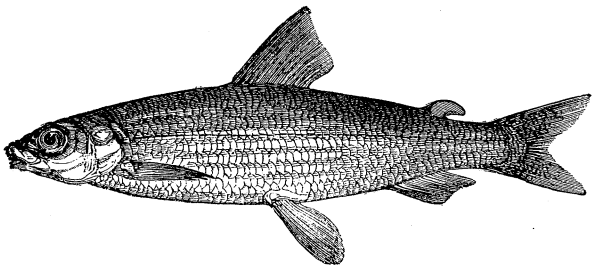
THE GRAYLING.

Genus THYMALLUS: *Thymallus*, includes the GRAYLING, *T. vulgaris*, found in the rivers of Northern Europe having rocky or gravelly bottoms. It resembles the trout in its habits and haunts; it weighs one to five pounds. Its flesh is highly esteemed.

BACK'S GRAYLING, *T. signifer*, is a very fine species, weighing five or six pounds; found in the waters of British America, flowing into the Arctic Ocean. Its specific name, *Signifer*—"the standard-bearer"—refers to the unusual size of the dorsal fin.

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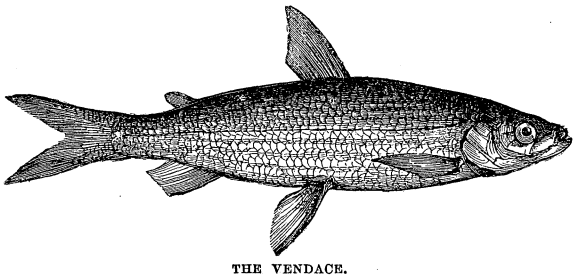
Genus COREGONUS: *Coregonus*, includes the GWYNIAD, *C. fera*, a lake fish of Northern Europe, ten to twelve inches long; it is gregarious, and approaches the shores in vast shoals in spring and summer, a hundred being often taken at a draft. They are called *Fresh-Water Herring*, and being cheap, are eaten by the poorer classes, though they are insipid. Many are preserved by salting.



THE GWYNIAD.

The ATTIHAWMEG or WHITE FISH, *C. albus*, resembles the Gwyniad and Vendace of Europe, but greatly surpasses them, being probably the most delicious of all known purely fresh-water fishes. Richardson says one may live upon it for years without tiring. Its average weight is three or four pounds, but it sometimes reaches twenty pounds. It is found in Chatauque Lake in Western New York, in Erie, and Huron, the finest in the latter. Here, indeed, it is chiefly taken, though it exists in the waters of the Northwestern British territories. It ascends the rivers connected with the lakes to spawn, in October. It feeds on shell-fish, small fishes, and insects, and is occasionally taken with the hook. It comes both fresh and salted to the New York market.

The OTSEGO BASS, *C. Otsego*, is one to two feet long, and is exceedingly beautiful, and of exquisite flavor; it is only found in Otsego Lake, and appears to be daily diminishing.



THE VENDACE.

The VENDACE, *C. Willughbii*, is a small fish, of delicate flavor, seven inches long, taken with nets in some of the Scottish lakes. In flavor it resembles the smelt. It spawns in November, when it congregates in vast shoals, making a noise like that of the herrings as they rise and fall to and from the surface. It is believed in Scotland that this fish was introduced there from the Continent, by Queen Mary.

THE GALIXIIDÆ.

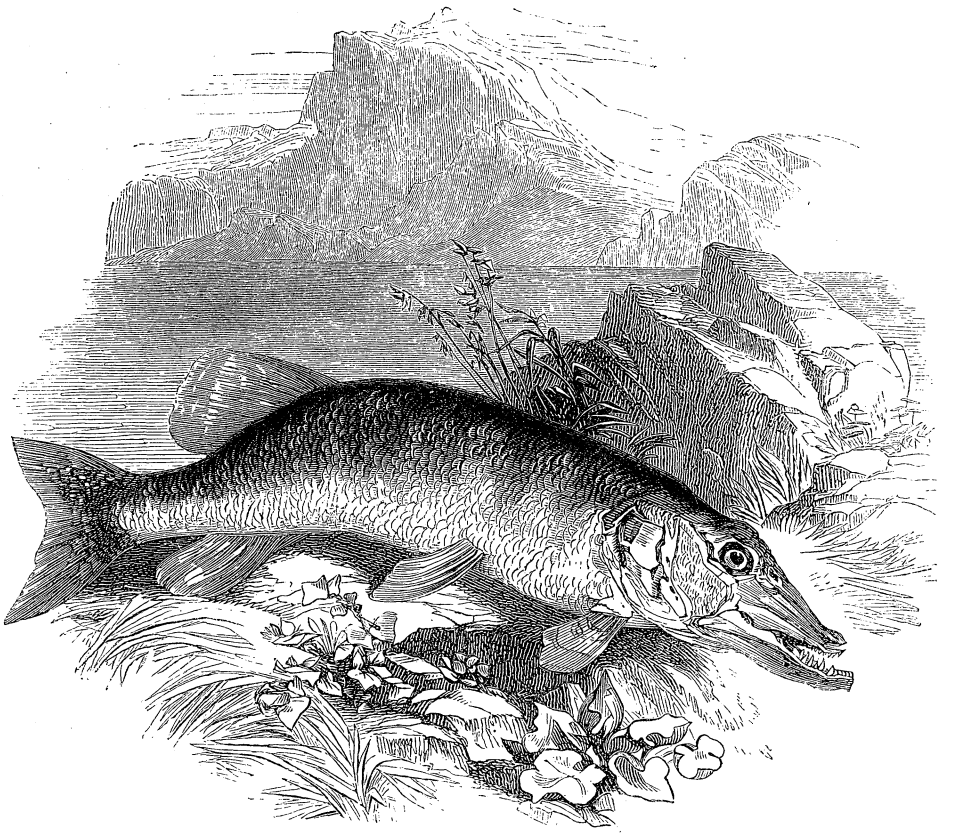
This family, established by Müller, contains the single genus *Galaxias*, placed by Cuvier with the *Esocidæ:* they agree with the salmons in their general structure; the opening of the mouth is small, with middle-sized teeth in both jaws; there are also a few stray crooked teeth on the tongue. The position of the dorsal and anal fins, and also the digestive organs, are like those of the pikes.

THE ESOCIDÆ.

In this family, which comprises the *Pikes*, the biting edge of the upper jaw is formed as in the *Salmonidæ*, by both the maxillary and intermaxillary bones; the mouth is furnished with a most formidable apparatus of teeth, almost all the bones which assist in the formation of that cavity being thus armed. All the known fishes of this family inhabit fresh water, and only occur in temperate climates. They are of an elongated form, clothed with cycloid scales, and furnished with powerful fins, their whole conformation being eminently adapted for that rapid motion through their native element, without which their voracious propensities would stand but a poor chance of gratification. The only fish now placed in this family are the true Pikes, and a few small fishes forming the genus *Umbra*, of which one species is found in the rivers of Austria.

Genus ESOX: *Esox*, includes the COMMON PIKE or PICKEREL OF EUROPE, *E. lucius;* it is strong, fierce, and active, swims rapidly, and occasionally darts along with the swiftness of an arrow. The spawn is deposited among weeds in March, or early in April, and at this season the spawning fish will be found in warm creeks or ditches connected with the larger waters which they generally inhabit. It is common in the principal lakes and rivers of Europe, and is

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THE EUROPEAN PIKE.

abundant in the British Islands, though it is believed not to have been indigenous there, but to have been introduced from the Continent some centuries ago. The usual length is from one to two feet, but there seems to be almost no limit to the growth of this fish. Its voracity is proverbial. Mr. Jesse says: "Eight pikes consumed nearly eight hundred gudgeons in three weeks, and the appetite of one of these was insatiable. One morning I threw to him, one after another, five roach, each about four inches in length; he swallowed four of them, and kept the fifth in his mouth for about a quarter of an hour, when it also disappeared."

"Digestion in the pike goes on very rapidly, and they are therefore most expensive fish to maintain. In default of a sufficient quantity of other fishes to satisfy them, moor-hens, ducks, and indeed any animals of small size, whether alive or dead, are constantly consumed; their boldness and voracity are equally proverbial. Dr. Plot relates that at Lord Gower's canal at Trentham, a pike seized the head of a swan as she was feeding under water and gorged so much of it as killed them both; the servants perceiving the head of the swan under water for a longer time than usual, took the boat, and found the pike and swan both dead. Gesner relates that a pike in the Rhone seized on the lips of a mule that was brought to drink, and that the beast drew the fish out before it could disengage itself. Walton was assured by his friend M. Segrave, who kept tame otters, that he had known a pike in extreme hunger, fight with one of his otters for a carp that the other had caught, and was then bringing out of the water; and with the old adage adds, 'It is a hard thing to persuade the belly, because it has no ears.'

"A woman in Poland had her foot seized by a pike as she was washing clothes in a pool, and the same thing is said to have happened at Killingworth pond, near Coventry. The late head-keeper of Richmond Park was once washing his hand over the sides of a boat in the great pond in that park, when a pike made a dart at it, and he had but just time to withdraw it." Mr. Jesse

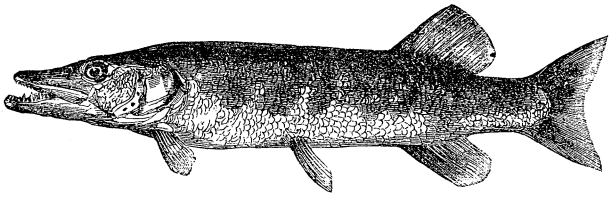
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adds, "that a gentleman now residing in Weybridge, in Surrey, walking one day by the side of the river Wey, near that town, saw a large pike in a shallow creek. He immediately pulled off his coat, tucked up his shirt-sleeves, and went into the water to intercept the return of the fish to the river, and to endeavor to throw it out upon the bank by getting his hands under it. During this attempt, the pike, finding he could not make his escape, seized one of the arms of the gentleman, and lacerated it so much that the marks of the wound are still visible."

Pliny considered the pike as the longest-lived, and likely to attain the largest size of any fresh-water fish. Pennant refers to one that was ninety years old; but Gesner relates that in the year 1497 a pike was taken at Hailbrun, in Suabia, with a brazen ring attached to it on which were these words, in Greek characters: "I am the fish which was first of all put into this lake by the hands of the Governor of the Universe, Frederick the Second, the 5th October, 1230." This fish was therefore two hundred and sixty-seven years old, and was said to have weighed three hundred and fifty pounds. The skeleton, nineteen feet in length, was long preserved at Manheim as a great curiosity in natural history. The lakes of Scotland have produced pike of fifty-five pounds' weight; and some of the Irish lakes are said to have afforded pike of seventy pounds; "but it is observed," says honest Izaak Walton, "that such old or very great pikes have in them more of state than goodness; the smaller or middle-sized pikes being by the most and choicest palates, observed to be the best meat."

The flesh of the pike is of good quality, and those of the Medway, in England, when feeding on the smelt, acquire excellent condition, with peculiarly fine flavor. In Lapland, and some other northern countries of Europe, large quantities of pike are caught during the spawning season, being then most easily taken, and are dried for future use.

In North America there are several species of this genus, some of them very remarkable. The Common American Pike or Pickerel, *E. reticulatus*, is from one to three feet long, and is found in most of the lakes, ponds, and rivers of the Middle and Eastern States. It is especially abundant in the numerous bright, limpid lakes of New England, and is there taken in large numbers. In habits it agrees with the European species; it not only feeds on fish, but on frogs, water-rats, and even young water-fowl. When introduced into a piece of water it soon makes almost every other species scarce, except the perch, whose bony spines protect it even from this wolf of the waters. It is taken in various ways, though perhaps most commonly with hook and line, having a small floating buoy and living bait. Frank Forester says: "I infinitely prefer trolling with the gorge-hook to fishing either with the common snap or what is here called the sockdollager hook, which last I regard as a great and dangerous humbug!" This fish is taken in considerable numbers in winter, by cutting through the ice. Its weight is two to five pounds; sometimes even, though rarely, twelve pounds.



THE PICKEREL.

The Long Island or Varied Pickerel, *E. fasciatus*, is common in the trout-ponds and clear running brooks of Long Island; it resembles the common pike, but is not more than half its size, rarely exceeding a pound in weight. It is remarkable for its very large scales. This fish is found in New Jersey, and generally in the State of New York.

The Great Northern Pickerel, *E. lucioides*, is an exceedingly fine species, weighing from four to ten, and even up to seventeen pounds. The back is of a rich blackish-green. It is bold and voracious, and takes any sort of bait in spinning or trolling; it is captured in winter by baits set through the ice, and is an essential resource to the Indian hunter when the chase fails him. It devours fishes of every variety, even its own species and the thorny perch, rats, reptiles, water-fowl, indeed any living thing that comes within its reach. It is found in the great lakes and rivers, from Lake Superior to the St. Lawrence.

The Mascalonge, a term said to be derived from the Canadian French, *Masque allongé*, and

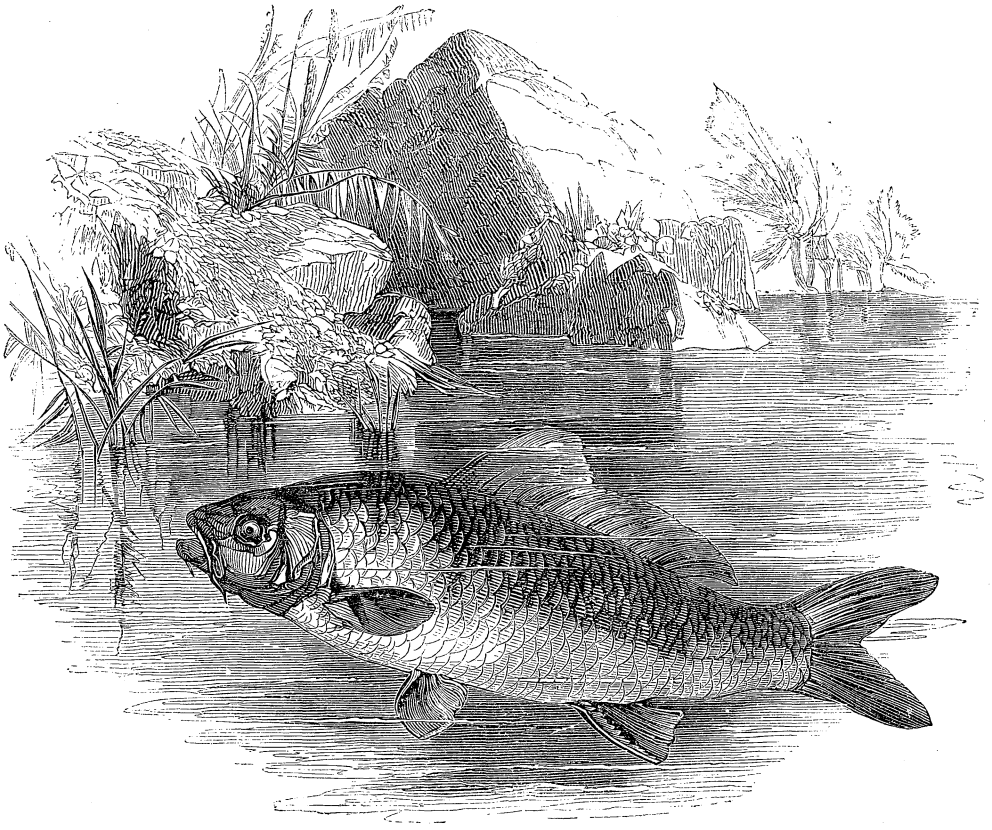
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referring to the long mask or snout of the fish, *E. estor*, "the finest, largest, and most excellent food of all the pike family," is found only in the great lakes and waters of the St. Lawrence basin. It is common in Lakes Erie, Ontario, and Huron. Its length is two to four feet, and it sometimes weighs sixty pounds. It is bold and voracious even beyond its kindred, and is taken with dead bait played with spinning tackle, and even by a bait of tin or red cloth, made to play quickly through the water. It is also often taken with the seine.

There are still many other species of pike in different parts of the world.

THE MORMYRIDÆ.

These, very few in number, are only found in the Nile and Senegal: they have a small electrical organ in the sides of the tail: the flesh is excellent.



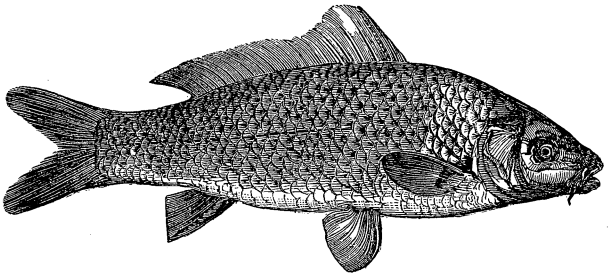
THE CARP.

THE CYPRINIDÆ.

This family, which includes the *Carps*, also embraces the greater portion of all the fresh-water fishes of temperate climates. They are distinguished by a small mouth and powerful teeth, though not set in the jaws. The body is usually compressed, and always clothed with scales, sometimes of very large, sometimes of very small size; the head is small; the dorsal fin single. The fishes of this family are found in great abundance in all the fresh waters of Europe. Many of them are much sought after by anglers, but rather for the sake of sport than for the goodness of their flesh, which is usually watery and insipid. In former times, however, when the transportation of marine productions, in a fresh state, to great distances from the coast was attended with greater difficulties than at the present day, these fish were regarded as of some importance,

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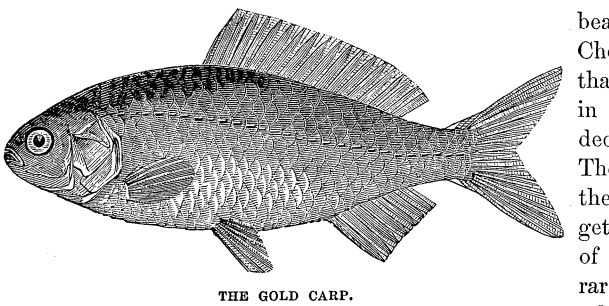
especially as a change from the salt-fish diet to which many good Catholics were condemned during Lent. The *Cyprinidæ* feed principally upon aquatic plants and worms; but a few of them seem occasionally to prey upon small fishes.



THE COMMON CARP.

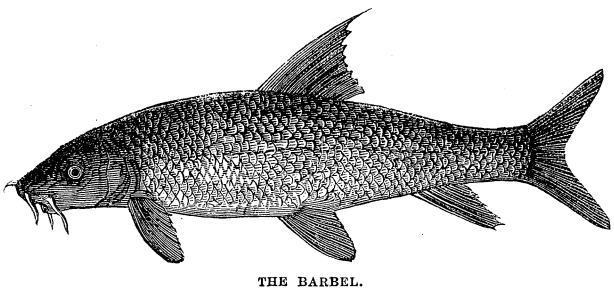
Genus CYPRINUS: *Cyprinus*, includes the COMMON CARP OF EUROPE, *C. carpio:* it is ten to forty inches long, and sometimes attains the weight of a hundred pounds; the general color is rich olive-brown above; yellowish-white beneath. It inhabits most of the fresh waters of Europe, lakes, ponds, and rivers, generally preferring still water. It is kept and cultivated in numerous reservoirs, especially in Austria, Prussia, and Great Britain. It was first introduced into the latter country about three centuries ago; it has also been introduced into this country with complete success, though on a limited scale. It is in season for the table from October to April. A carp has been known to live to the age of one hundred and fifty years.

The GOLD CARP, *C. auratus*, often called *Gold-Fish* and *Silver-Fish*, as it assumes both colors, is originally from China, the most beautiful species being taken from Lake Che-Kyang. Every person of fashion in that country is said to keep them, either in porcelain vessels or in the basins that decorate the courts of Chinese houses. The elegance of their form and colors, and their playful and graceful motions, together with their tameness and facility of production, and what is exceedingly rare in fishes, a seeming affection for each other, have made them favorites everywhere as ornaments of the parlor and the fountain. Though they can bear high as well as low degrees of heat, still they thrive best in water at a temperature of about eighty degrees.

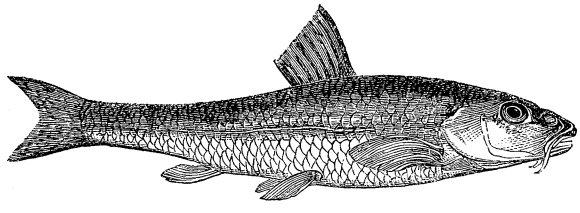


THE GOLD CARP.

Genus BARBUS: *Barbus.*—This includes the BARBEL, *B. vulgaris*, said to be so called on account of the barbs or wattles about its mouth; it is common in the warm and temperate parts of Europe, being abundant in the Rhine, Elbe, and Weser; also in some of the English rivers. They are shy of observation, but are said, when supposing themselves unnoticed, to show considerable playfulness. They grow to the size of fifteen pounds, and in some places are caught in large numbers for food. In cold weather they become torpid, and may be taken by the hand.



THE BARBEL.



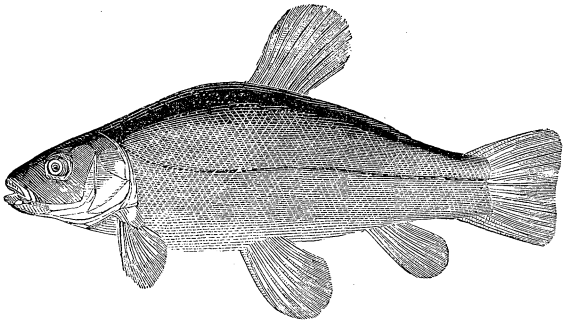
THE GUDGEON.

Genus GOBIO: *Gobio.*—This includes the GUDGEON, *G. fluviatilis:* it is common in Europe, and is found in streams which flow over gravelly soil. It swims in shoals, feeds on worms, aquatic insects and

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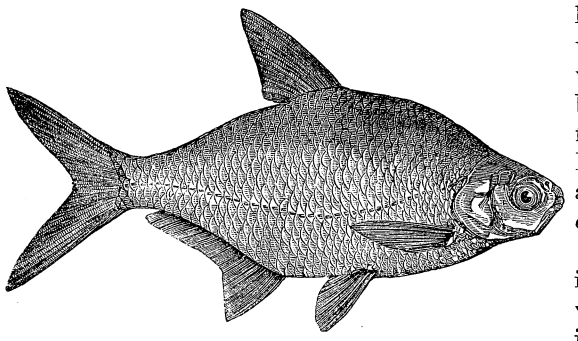
their larvæ, and molluscous animals. It is small, rarely exceeding eight inches in length, and affords excellent sport to young anglers. It spawns in May, among stones in shallow water. The Thames fishermen take great numbers in casting nets. The NIAGARA GUDGEON, *G. cataractæ*, found near the Falls of Niagara, is five inches long.

Genus TINCA: *Tinca*, includes the TENCH, *T. vulgaris*, found in most European lakes and rivers. It is exceedingly tenacious of life; loves foul and weedy water; thrives even where the mud is of an intolerably fetid odor, and so black as to color the fish with its own inky hue. It is easily propagated, and is esteemed a useful fish, the flesh being tolerably good. It spawns about the middle of June.



THE TENCH.

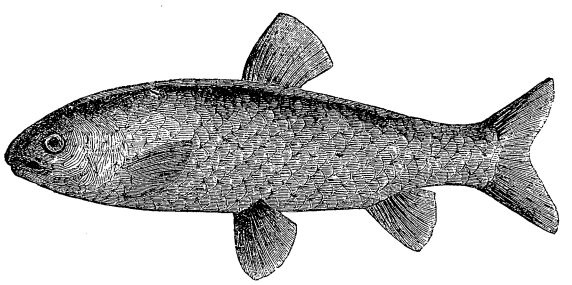
Genus ABRAMIS: *Abramis*, includes the BREAM, *A. brama*, an inhabitant of the lakes and rivers of Europe generally. It is very abundant in the larger lakes and quiet rivers of Great Britain and Ireland. It swims in shoals; feeds on worms, with other soft-bodied animals, and some vegetable substances. Its flesh is insipid, but the breeding of it is encouraged to feed pike and other voracious fishes. In Ireland it grows to the weight of twelve and fourteen pounds; one pound is the common weight.



THE BREAM.

The VARIEGATED BREAM, *A. versicolor*, is an American species, of a silvery color, varied with blue, green, and golden. It is five to seven inches long, and common in the rivers and ponds of New York and New England. Its flesh is savory, and it is caught by young fishermen in considerable numbers. It is often seen in the markets of New York. It is sometimes called *Yellow-bellied Perch*, and also *Wind-Fish*, as it is seen when a flaw of wind ruffles the surface to dart by hundreds, and often thousands, to the top of the water. The COMMON POND-FISH, *Pomotis vulgaris*, abundant in all parts of the country, shares with this the title of *Bream*, and also the popular designation of *Pumpkin-seed*.

Genus LEUCISCUS: *Leuciscus*, includes the IDE, *L. idus*, inhabiting large rocky lakes, from which it seeks its way into the rivers to spawn in April or May. It feeds on worms and herbage, and the flesh is of good flavor. It is common in Northern Europe.



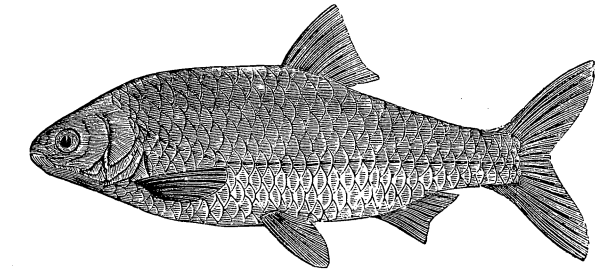
THE IDE.

The ROACH, *L. rutilus*, is abundant in the rivers of the temperate parts of Europe. It is gregarious, and feeds like the preceding. It attains the weight of one to two pounds. In the proverb, "*sound as a roach*," the last word is to be pronounced *rock*. The English also say *sound as a trout*. The Italians have a similar proverb—*healthy as a fish;* and the French say, *as hale as a gardon*, the latter being their name for the ide.

The DACE, *L. vulgaris*, also called *Dare* and *Dart*, feeds on worms and other soft substances;

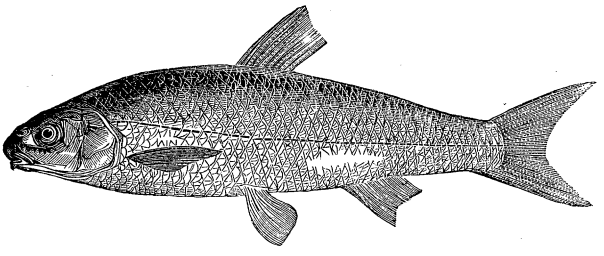
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spawns in June; is six to nine inches long; is used as bait for pike in trolling, on account of its silvery brightness. It is common in the deep, clear, quiet streams of Italy, France, and Germany; it is also met with in Great Britain.



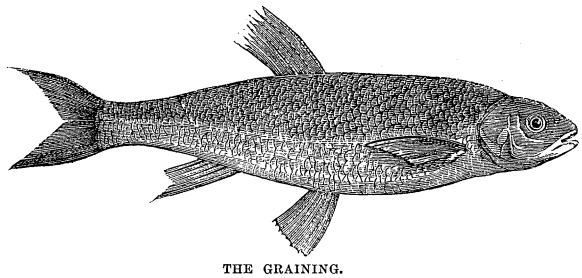
THE ROACH.

The Graining, *L. Lancastriensis*, is found in the lakes and rivers of some parts of Europe; in its habits and food it resembles the trout, and is fished for with artificial flies. The average weight is half a pound. The flesh is excellent.

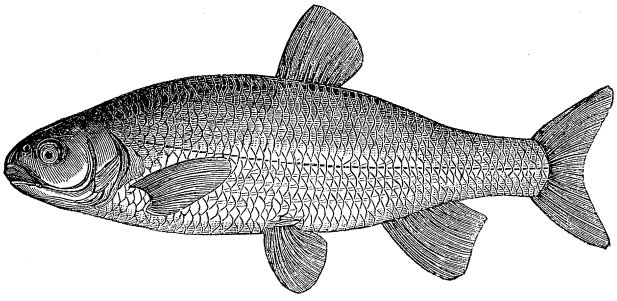


THE DACE.

The Chub, *L. cephalus*, frequents deep places in the quiet parts of streams, sheltering itself usually under a bush or tree that may screen it from view. It feeds on worms and insects in their various stages. It is commonly caught by dibbing, that is, by a fly or bait drawn along on the surface of the water. It spawns in April or May, weighs one to five pounds, and though a coarse fish, is esteemed palatable when broiled with the scales on. The chub is common in the river Thames, at London, and is there much angled for, the bait being cockchafers, dibbed along on the surface, which gives them an action as if they had fallen into the water and were struggling to escape. Though a shy fish, it is said the chub cannot resist a cockchafer thus presented to it.

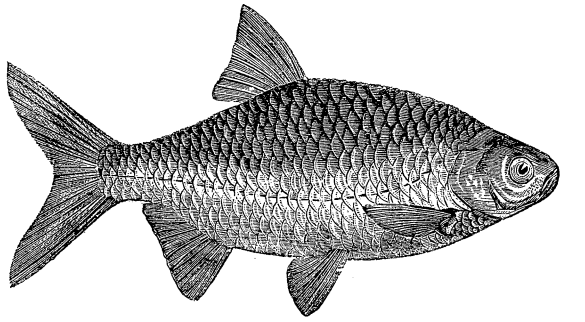


THE GRAINING.



THE CHUB.

The Red-Eye or Rudd, *L. erythrophthalmus*, is a very common fish in Europe; it is of brilliant colors, and very tenacious of life; it feeds on worms, molluscous animals, insects, and some vegetable matters. Its weight is one to two pounds. It is tolerable food, and is much used for bait for pike. It breeds freely, without any care bestowed upon it, on which account it is cultivated as food for trout, perch, and pike.

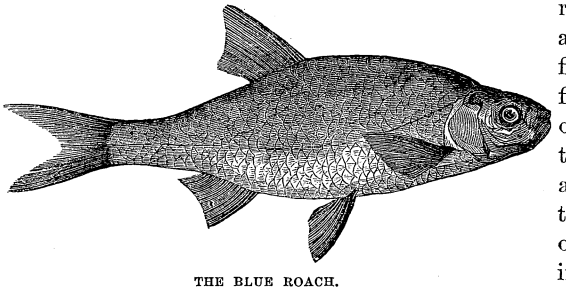


THE RED-EYE.

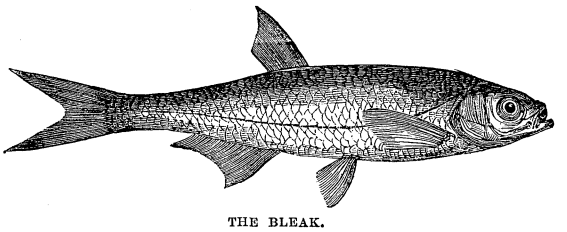
The Azurine or Blue Roach, *L. ceruleus*, is a small fish, seldom exceeding a pound in weight; the flesh is firm, and of good flavor. It is hardy, tenacious of life, and spawns in May; found in Great Britain, and also in some of the Swiss lakes.

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The Bleak or Blick, *L. alburnus*, is a well-known, small species, inhabiting many of the rivers of Europe; it is tolerable food, and affords amusement to young fly-fishers. It rises eagerly to almost any fly, and sports incessantly on the surface of the water of a fine day. Mr. Jesse says they appear to be always restless and always happy. Nevertheless, the intestines are frequently found to be partly occupied by a species of tape-worm. The inner surface of the scales of this fish, as well as that of the roach, dace, and white-lint, is used as a silvery pigment for giving luster to artificial pearls. Formerly this was in great request, and a quart of these scales was sold for from five to twenty dollars.



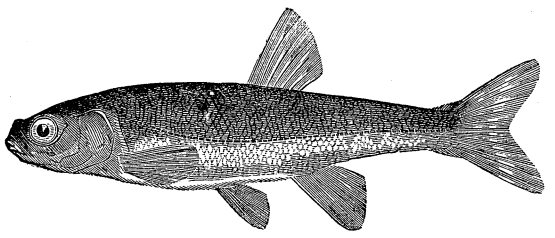
THE BLUE ROACH.



THE BLEAK.

The following species of *Leuciscus* are described by Dr. De Kay as found in the rivers and lakes of New York and the vicinity: the Black-nosed Dace, *L. atronasus*, one to three inches long: the Spawn-Eater, *L. Hudsonius*, three to six inches long: the Red-Fin, *L. cornutus*, sometimes called *Red Dace* and *Rough-Head*, three to six inches long: the Roach-Dace, *L. pulchellus*, a beautiful species, ten to fourteen inches long; common in New England, where it is called *Cousin Trout:* the Shining Dace, *L. nitidus*, two to six inches long; called *White Dace* and *Shiner* at Lake Champlain: the Black-headed Dace, *L. atromaculatus*, six to twelve inches long; sometimes called *Lake-Chub* and *Lake-Dace:* the Bay Shiner, *L. chrysopterus*, four to six inches long: a beautiful species, caught in New York Bay: the Silvery Dace, *L. argenteus*, six inches long; common in New England: the Banded Dace, *L. vittatus*, two to four inches long: the Corporaalen, *L. corporalis*, ten to fifteen inches long; found in the Hudson, Oneida Lake, &c.: and the Pigmy Dace, *L. pygmæus*, one inch long, &c.

The Minnow, *L. phoxinus*, is one of the smallest of European fishes, seldom exceeding three inches in length; it inhabits rivers, brooks, and canals, is exceedingly prolific, and spawns in June. It is the fish on which a young angler usually takes his first lessons; it is extensively employed as bait for pike, trout, and large perch. The name *Minnow*, and also that of *Minim*, which is common, are said to be derived from the Latin, *minimus*, having reference to the extreme minuteness of the fish.



THE MINNOW.

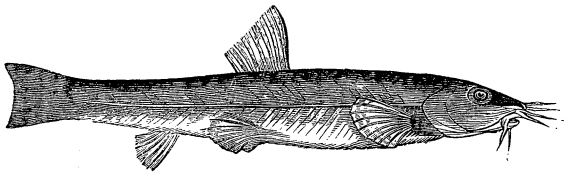
Dr. De Kay describes among American Minnows the following: Transparent Minnow, *Hydrargira diaphana*, three to five inches long; back brown-olive, sides delicate blue, lower parts white; found in Saratoga Lake, where it is used for bait: the Barred Minnow, *H. multifasciata*, three inches long; found in the same locality; possibly the young of the preceding: and the Champlain Minnow, *H. atricada*, three and a half inches long. Frank Forester says that we have not in this country the *Minnow* proper of Europe, but many species of the *Hydrargira*, or American minnow, "which, as live bait for pike, perch, and cat-fish, are not to be equalled. They are generally known as *Killy-fish*." The Big Killifish, *Fundulus viridescens*, abounds in salt-water creeks in the neighborhood of New York; it is popularly called *Minny* and *Big-killie*. The Striped Killifish, *F. fasciatus*, is found in the same localities.

Genus STILBE: *Stilbe*, includes the New York Shiner, *S. chrysoleucas*, a beautiful little

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fish, common in every pond and stream throughout the temperate parts of North America. It is commonly associated with the little POND-FISH, or SUN-FISH, *Pomotis vulgaris*, already mentioned, and the YELLOW PERCH, *P. flavescens*.

Genus COBITIS: *Cobitis*, includes the LOACH, *C. barbatula*, sometimes called *Beardie*. It feeds on worms and aquatic insects, spawns in March or April, delights in small, shallow, clear streams, and has the habit of lurking under stones. It is noted for having six barbules about the mouth. Yarrell remarks that "fishes thus provided are known to feed at or near the bottom of the water, and it has been stated in this work that those species which reside constantly so near the bottom as to acquire the name of ground-fish, have a low standard of respiration and a high degree of muscular irritability. In the animals possessing this duration of the power of muscular contractility, as the eels, flat-fish, and many others, there is reason to believe there exists also great susceptibility of any change that occurs in the electrical relations of the medium in which they reside; the restless movements of eels and other ground-fish during thunder, receive at least a probable explanation in the belief that no alteration in the weather takes place without some previous change in the electrical state of the atmosphere, which by quality or quantity may affect the water.



THE LOACH.

"The Chinese, who breed and rear great quantities of gold carp, find that thunder does them harm, and even sometimes kills them. Pennant says that lobsters fear thunder, and are apt to cast their claws after a loud clap. These effects may be referred to spasmodic action of the muscles, induced by electrical influence. If fishes of opposite habits, such as surface-swimmers and ground-fish, are put together into the same vessel of water, and a slight galvanic discharge be passed through the fluid, the ground-fish, with the lowest degree of respiration, will be the most agitated."

Genus LABEO: *Labeo*, includes several American species with fleshy lips, often crenated. They are of little value for the table. The CHUB-SUCKER, *L. elegans*, is eight inches long; dark bluish above, beneath whitish, with pink suffusions along the abdomen; little esteemed for food, but common in the New York market in autumn. The BRILLIANT CHUB-SUCKER, *L. oblongus*, is six to twelve inches long; a beautiful species, appearing in our markets in December. It is familiarly known under the name of *Chub*. The LONG-FINNED CHUB-SUCKER, *L. cyprinus*, is twelve to twenty inches long; resembles the carp of Europe, and is popularly called *Carp;* found in the rivers of Western New Jersey, and in the Susquehannah. The GIBBOUS CHUB-SUCKER, *L. gibbosus*, is seven to twelve inches long; common in the fresh-water streams of New York. The ROUND-BACKED CHUB-SUCKER, *L. esopus*, is ten to twelve inches long; found in the interior of New York.

Genus CATOSTOMUS: *Catostomus*, includes only American species, having thick, fleshy lips, which are crenated or plaited; the lower lip is pendant. The COMMON SUCKER, *C. communis*, is twelve to fourteen inches long; the head is smooth and scaleless; the scales of the body reticulate; body dark purplish above, with pink and metallic tints on the sides, frequently with a resplendent golden hue extending over the abdomen; beneath white. The flesh is insipid, but it is common in the New York markets.

The ONEIDA SUCKER, *C. Oneida*, is twelve inches long; dark blue above; beneath whitish; common in Oneida Lake, where it is called *Mullet* and *Sucker*. The HORNED SUCKER, *C. tuberculatus*, is seven to ten inches long; common in the New England and Middle States, and is called *Barbel*, *Dace*, and *Horned Dace*. The PALE SUCKER, *C. pallidus*, is nine to ten inches long; it is a common species, abundant near Peekskill. The MULLET SUCKER, *C. aureolus*, is twelve to eighteen inches long; is indifferent food; goes by the names of *Mullet*, *Golden Mullet*, and *Red Horse*. De Kay says he has seen them full of worms in August and September. Common in Lake Erie. The BLACK SUCKER, *C. nigricans*, is thirteen to twenty inches long, and is common in Lake Erie, where it has the whimsical name of *Shoemaker*. It is

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found in New England. The LARGE-SCALED SUCKER, *C. macrolepidotus*, is found in the Delaware River. These species are doubtless more widely distributed than we have indicated in the particular descriptions; there are also several other species.

THE PÆCILIIDÆ.

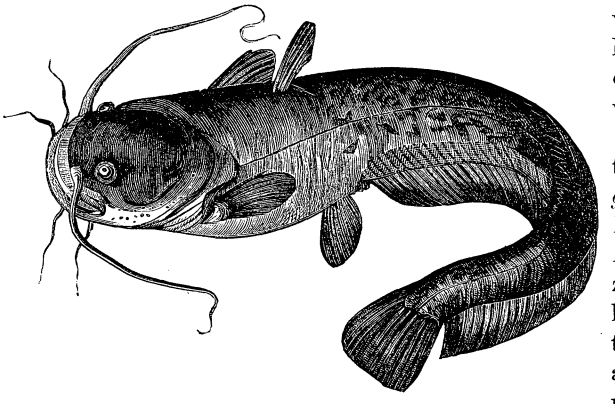
These fishes so closely resemble the carps that they were formerly included with them as of the same family. They are small, scaly fish, inhabiting the fresh waters of warm climates. The best known species is the FOUR-EYED LOACH, *Anableps tetrophthalmus*, of Guiana.

THE CHARACINIDÆ.

These seem to be intermediate between the *Cyprinidæ* and the *Salmonidæ*. They are found in rivers and lakes of tropical countries, and some attain a large size. A few are very voracious: the *Serrasalmones* are said to seize upon water-fowl, and even to attack men while bathing.

THE SILURIDÆ.

This family includes numerous species of fresh-water fishes, often of considerable size, the skins usually naked, or more or less covered with bony plates, especially about the head. They are for the most part confined to the rivers and lakes of warm countries.



THE SLY SILURUS.

Genus SILURUS: *Silurus*, includes the SLY SILURUS or SHEAT-FISH, *S. glanis*, found in the rivers of Central Europe, and in those of Asia and Africa, and also in the lakes of Switzerland. It sometimes attains the length of six feet, and the weight of three hundred pounds. It is a slow and sluggish fish, lying in wait for its prey in holes and muddy bottoms. It is very voracious, and has been known to devour children; the body of a woman has also been found in one of them. Its flesh is white, and relished by many persons.

Genus MALAPTERURUS: *Malapterurus*, includes the *M. electricus*, ten to fifteen inches long; found in the Nile and Senegal Rivers, and has electrical properties, though in no great degree.

Genus PIMELODUS: *Pimelodus*.—This includes several remarkable American species, generally called *Cat-Fish*. The GREAT LAKE CAT-FISH, *P. nigricans*, is two to four feet long, and weighs from six to twenty-five pounds; color deep olive-brown; prefers muddy bottoms, and is usually taken with the spear. Found in Lake Erie. Its flesh is little valued.

The COMMON CAT-FISH, *P. catus*, is six to ten inches long, nearly black above, pearly-gray beneath. It is armed with sharp spines, which frequently inflict a smarting wound on the hand of the incautious angler. This is a common species in all the Atlantic States; it is frequently called *Horn-Pout*, *Bull-Pout*, and *Minister*.

The GREAT HURON PIMELODE, *P. pallidus*, often called *Channel Cat-Fish*, attains a weight of one hundred and fifty pounds. The skin is smooth, thick, and lubricated by a mucous secretion; the color is dingy greenish-brown. The flesh is rich and gelatinous, and resembles that of an eel. It is a greedy biter, and takes almost any animal bait.

Dr. Kirtland has named several other species, found in the waters of Ohio, and there are still others, some of great size, in the Mississippi and other Southern and Western rivers. It is said there are thirty species of cat-fish in the interior waters of the United States.

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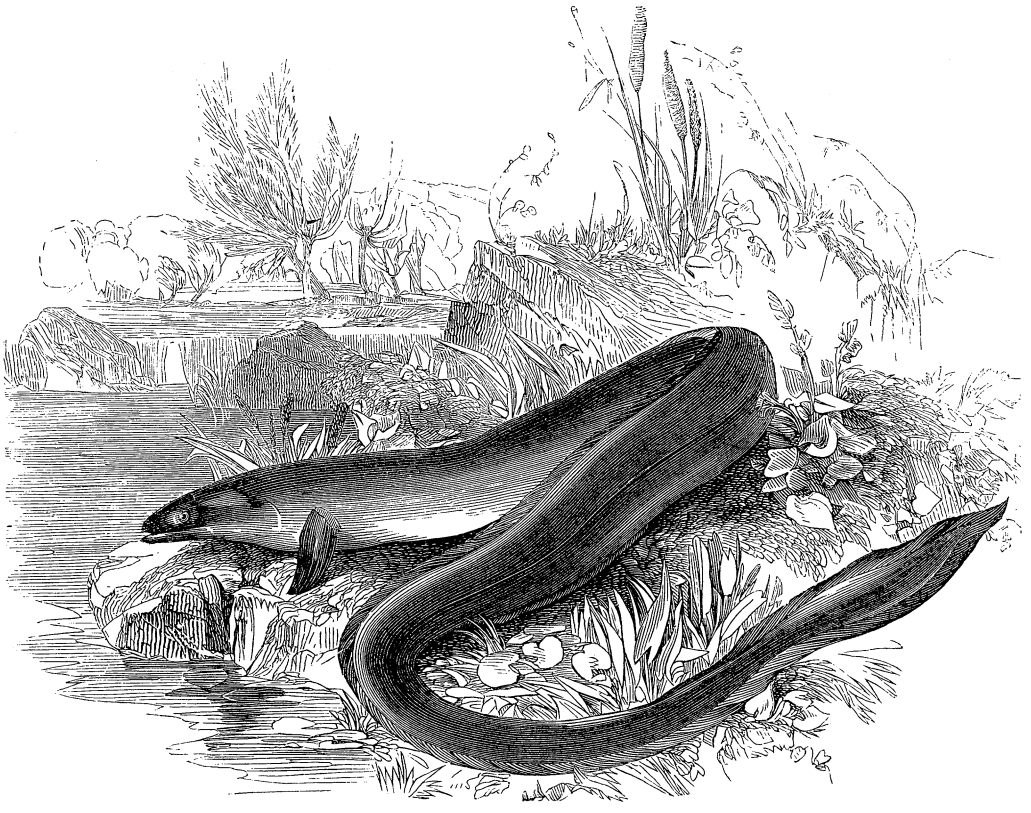
Genus GALEICHTHYS: *Galeichthys.*—This includes the OCEANIC CAT-FISH, *G. marinus*, one to two feet long, found on our coasts; its flesh is said to be excellent.

THE LORICARIIDÆ.

This family includes several South American species, which have the whole body covered with an armor of bony plates. They are nearly allied to the Siluridæ.

THE AMBLYOPSIDÆ.

This family includes a single species, the BLIND FISH, *Amblyopsis spelæus*, found in a small lake or stream in the great Mammoth Cave of Kentucky. It is three and a half inches long, the eye covered with opaque skin, or entirely wanting. The anus is situated on the throat in front of the pectoral fins. The young are brought forth alive.



THE COMMON EUROPEAN EEL.

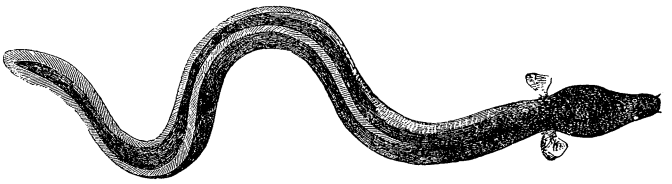
THE MURÆNIDÆ.

Having described the *abdominal* species of the Physostomata, we now come to the *apodal* species. The first family is the *Murænidæ*, which includes the common Eels. These have an elongated form, and a soft, thick, slimy skin; the scales are very minute, and imbedded in the thick, fat cuticle so as only to be seen when this is dried. The gill orifices are small, and carried far back, so that the branchiæ are protected, on which account these animals can live a considerable time out of water. They are averse to cold, and are not found in high northern countries. Many species of eels constantly inhabit the sea; others generally live in rivers, lakes, and ponds, and usually make two annual migrations, one in the autumn to the brackish waters of the estuaries of rivers, and one in spring, when they return to the fresh waters. In winter they lie concealed in the mud, but are often taken in this condition by spears. The reproduction

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of eels has been a matter of dispute: Aristotle believed them to spring from mud; at a later day they were supposed to be bred in turf; another idea was that the hair of the tails of stallions, deposited in water, would turn into eels. For a long period they were supposed to be viviparous, but they are now known to breed by means of eggs produced from roe, like most other fishes.

Genus ANGUILLA: *Anguilla*, includes the SHARP-NOSED EEL OF EUROPE, *A. acutirostris:* it is from one to four feet long, and weighs from one to twenty-five pounds. This species feed on frogs and fish, and are most active at night. They occasionally quit the water and glide over the meadows when moistened with dew, as well to change their position as to obtain food. The young grow to the length of a foot the first year. This is the common eel of Europe, and is found in most of the rivers of the milder parts; its abundance in the rivers of England is astonishing: in the Thames eighteen hundred young ones have been calculated to pass by a given point in a minute. The flesh is very savory, and extensively consumed.



THE SHARP-NOSED EEL.

Another European species is the BROAD-NOSED EEL, *A. latirostris*, which is nearly as common as the preceding, but seldom weighs over five pounds. The SNIG, *A. mediorostris*, resembles the common eels, but is less abundant. Found throughout Europe.

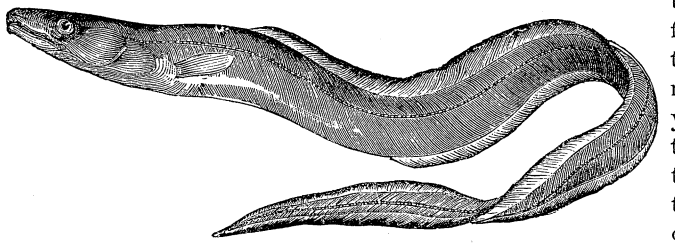
The COMMON NEW YORK EEL, *A. tenuirostris*, is one to two feet long, and seems to be the American representative of the sharp-nosed eel of Europe. It is greenish-olive above, yellow beneath. It is very savory and abundant, being caught in our bays and creeks at all seasons of the year. In spring it is taken in large willow-baskets, called *eel-pots*, and by torch-light in the evening with spears. In the winter it is speared through holes broken in the ice, being at this time in a torpid state. It is very voracious, feeding on water-insects, small insects, and any kind of animal matter. It often moves from one creek to another by crawling over the land. The *Silver Eel* is thought by De Kay to be only a variety of this; the Common Eel of Massachusetts and New England is also probably of this species.

The BEAKED EEL, *A. rostrata*, is eighteen to twenty-four inches long, and found in the waters of Western New York.

The SEA-EEL, *A. oceanica*, is from two to five feet long; has very thick and fleshy lips; resembles the conger eel; found on our coast.

The BULL-HEAD EEL, *A. macrocephala*, has the head large, the eyes large and prominent; above it is olive-yellow, beneath white; found in Saratoga Lake. The BOSTON EEL, *A. Bostoniensis*, is two feet long, and found on the northern coast.

Genus CONGER: *Conger*, includes the CONGER EEL, *C. vulgaris:* it varies in length from three to ten feet, and in weight from five to one hundred and thirty pounds. It is a most voracious fish, feeding often on the young of its own species; from the stomach of one that weighed twenty-five pounds, Mr. Yarrell took three dabs and a young conger three feet long. The flesh is not in much estimation, but being sold cheap, is largely used by the poorer classes. Common in the European waters; abundant on the British and French coasts.

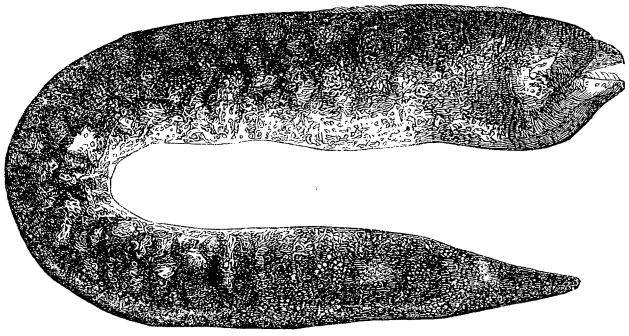


THE CONGER EEL.

The AMERICAN CONGER EEL, *C. occidentalis*, resembles the preceding, but is said to have some difference of construction in the teeth. It is found on our coasts, and is sometimes seen in

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the New York markets; but its flesh is unsavory. It is a vicious animal, snapping at any thing near it, when captured.



THE MURÆNA.

Genus MURÆNA: *Muræna*, includes the MURÆNA, *M. Helena*, a celebrated species, common in all parts of the Mediterranean, and occasionally met with on the coasts of Great Britain. It is four to six feet long, and lives in fresh or salt water; its flesh is white, and of good flavor. It was greatly esteemed by the ancient Romans, who kept large supplies of it in their numerous vivaria. Julius Cæsar, in one of his triumphs, distributed six thousand of these fishes among his friends.

THE GYMNOTIDÆ.

Genus GYMNOTUS: *Gymnotus*, includes the ELECTRICAL EEL, *G. electricus*, which frequents the ponds and marshy places of South America. This fish possesses a most wonderful power of communicating an electrical shock to any thing with which it comes in contact; and this is said to be sufficiently strong to knock down a man, and deprive him of the use of a limb for some hours. It attains a length of five or six feet, and as the apparatus from which the electricity is evolved extends throughout the greater part of its body, it may readily be imagined that the discharge of such a battery must be formidable. The apparatus is composed of four longitudinal bundles, placed one on each side of the dorsal, and one on each side of the ventral region of the body. These bundles are composed of a multitude of horizontal parallel plates, which are intersected by transverse vertical plates, the quadrangular canals thus formed being filled with a gelatinous matter. The whole apparatus is liberally supplied with nerves, and may be considered to represent an exceedingly complicated galvanic battery. So powerful, in fact, is the current of electricity evolved by it, that it can decompose chemical compounds, and magnetize steel needles. It appears that the anterior portion of the apparatus is positive, and the posterior negative; and that those parts of it only which are in contact with an object are implicated in the production of the current. Nevertheless, it is said that the animal can make use of it in benumbing small fishes at some distance from it in the water. The Indians of South America, when they wish to capture this fish, commence their operations by driving a number of horses and mules into the ponds inhabited by them; the eels, alarmed at the disturbance, immediately attack the intruders upon their quiet domain, usually applying their entire length to the bellies of the unfortunate quadrupeds, and thus giving the full effect of the whole electrical apparatus. Some of the horses soon become disabled, and falling down in the water, are drowned; the others, being driven back by the shouts and whips of the Indians, continue the conflict until the powers of the gymnoti are, for the time, exhausted. These then endeavor, in their turn, to escape from the scene of warfare, and for this purpose approach the shore, where another enemy awaits them: the Indians, armed with harpoons attached to long cords, strike at all that come within reach, and by jerking them rapidly out of water, so as to keep the cord from getting wet, contrive to secure their booty without receiving any shock.

Several other species of this family are found in the waters of South America, but none of them appear to possess electrical properties. Mr. Wallace found ten species in the small streams near the sources of the Rio Negro and Orinoco: he says that they are all eaten, but that, owing to the number of forked bones which they contain, they are but little esteemed. The Indians informed him that a rostrated species, common in the rivers, has a very singular and ingenious manner of obtaining its nourishment. They state that its principal food consists of ants and white ants, insects which are exceedingly abundant in those regions, and that, to procure them, it approaches the shore and lays its tail upon the ground. The ants, attracted by the slimy matter with which

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this tempting morsel is covered, soon crawl thickly upon it, when the fish suddenly dives into the water, leaving its prey struggling on the surface, from which it can pick them off at its leisure.

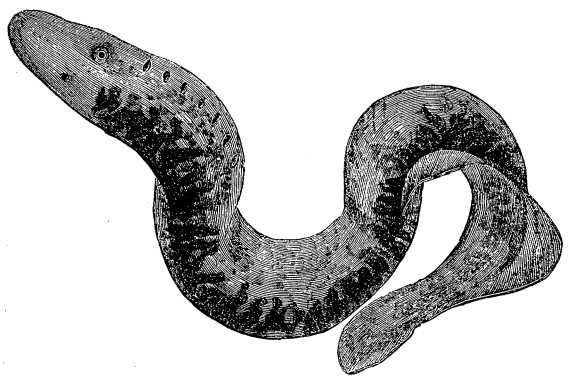
THE SYMBRANCHIDÆ.

In this family the branchial apertures, instead of being placed at the side of the head, as in the two preceding families, unite to form a single opening, often divided by a longitudinal partition, in the throat. They are all inhabitants of tropical countries, and live in fresh water.

ORDER 4. CYCLOSTOMATA.

This order contains a number of species of an elongated, cylindrical, and somewhat worm-like character, of which the *Lampreys* are well-known examples. In respect to their skeletons and some other parts of their organization, they are of the lowest rank in the scale of vertebrated animals.

Genus PETROMYZON: *Petromyzon*, includes the SEA-LAMPREY, *P. marinus*, which is oviparous, spawns late in the spring, and is usually about two feet long. The color is yellowish marked with brown. Like the sharks and rays it is without an air-bladder; to prevent itself from being carried about by currents of water, it frequently attaches itself to stones by the mouth, whence it is called *Stone-sucker*. It feeds on soft animal substances, and is found in the rivers of Europe not far from the sea. It is highly esteemed for the table. There are other species.

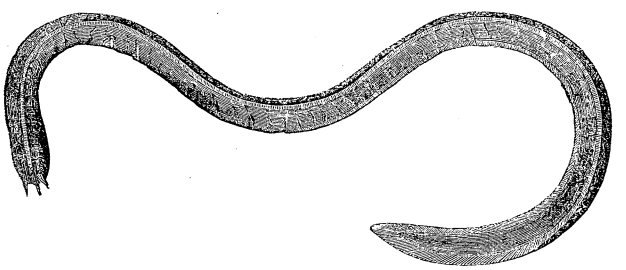


THE EUROPEAN LAMPREY.

The AMERICAN SEA-LAMPREY, *P. Americanus*, resembles the preceding, though it is larger, and sometimes reaches three feet in length. It is taken in our bays and creeks in April; it ascends rivers and constructs conical heaps of stones where the spawn is deposited. The flesh is greatly relished.

There are several species of river lamprey as well in Europe as America.

Genus AMMOCŒTES: *Ammocœtes*, includes the PLAIN MUD LAMPREY, *A. unicolor*, common in the United States. It is popularly called the *Lamper-Eel*, and is used for fish-bait.



THE MYXINE.

Genus MYXINE: *Mixine*, includes the MYXINE OF EUROPE, *M. glutinosa* of Linnæus, *Gastrobranchus cœcus* of other authors, called *Glutinous Hag* and *Borer* in England. The body is long and eel-like, and the skeleton is reduced to a mere cartilaginous tube. It pours out such an abundance of glutinous matter from the pores of the lateral line, that the water in the vases in which it is kept seems to be converted into jelly.

ORDER 5. LEPTOCARDIA.

This includes a single small fish which rarely attains a length of over two inches, called the *Amphioxus lanceolatus*. It is of a worm-like form, the vertebral column represented by a gelatinous cord, which supports the axis of the nervous system. The brain and spinal marrow appear

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to be one. The head bears a pair of eyes; the mouth is destitute of jaws, but is surrounded by a number of cartilaginous points. The circulation of the blood is effected entirely by the contractile force of the arteries; the blood itself, unlike that of all other vertebrata, is perfectly colorless. This creature lives in sandy ground at a depth of between ten and twenty fathoms water. It is very tenacious of life, subsisting for hours out of water; it dislikes the light, and bears handling without injury. It has been frequently taken on the British coasts, and has excited great curiosity by its anomalous structure.

Fossil Fishes.—The remains of extinct fishes are exceedingly abundant in various parts of the world. These, with the existing races, have been grouped by M. Agassiz, in his celebrated work, *Recherches sur les Poissons Fossiles*, in four divisions, the *Placoides*, *Ganoides*, *Ctenoides*, and *Cycloides*, these being severally distinguished by the structure of their scales. The term *Placoides*, including the sharks, rays, &c., is derived from the Greek *plax*, a plate or slab, and is applied to the first of these groups on account of the irregularity which the solid tegumentary parts present. The *Ganoides*, from the Greek *ganos*, splendor, and embracing the siluridæ, sturgeons, &c., are distinguished by the angular form of their scales. In the *Ctenoides*, including the flat fishes, percidæ, &c., named from the Greek *ctenos*, a comb, the scales consist of laminæ, whose posterior and free margin is pectinated. In the *Cycloides*, including the bass, cod, salmon, carp, &c., and named from the Greek *cyclos*, a circle, the scales consist of simple laminæ, with the posterior margin smooth.

The number of species of extinct fishes in the British Islands alone, noted by M. Agassiz, is over five hundred. Some existing species have no representatives in the older strata. The most ancient of the finny races, in a geological sense, are the Placoid fishes.

The Artificial Propagation of Fishes.—It has been long known that the eggs of fishes could be taken and transported from one place to another, and there, being placed in water suited to them, would hatch and produce thrifty offspring. The Chinese have practiced this for ages, and the ancient Romans conducted it on an extensive scale, in this manner not only stocking natural lakes and streams with various kinds of fish, but also their vast artificial reservoirs. Modern naturalists had gone somewhat farther, having discovered the mode by which the eggs of fishes are fecundated, that is, by strewing the ova of the female with the milt of the male. No attempt, however, appears to have been made to take practical advantage of this fact, and to render the artificial breeding of fishes a general system of national economy, till within a few years. In 1850 the attention of the French Government was called to the operations of two illiterate but ingenious fishermen, Messrs. Géhin and Remy,* in the little village of Bresse, on the eastern borders of France, among the Vosges Mountains, who, as it appears, of themselves, and without instruction, conceived and put in practical operation the artificial breed-

* The history of the proceedings of Géhin and Remy is thus given in Mr. Fry's excellent and interesting work: "As long ago as 1841, they commenced to observe carefully the habits of the trout, and in the month of November of that year, during a full moon, they passed night and day on the bank of a river, never for an instant losing sight of these fish, and watching most intently all their preparations for laying and preserving their eggs.

"The results of their observations were these:

"The trout come together in a shoal, and choose a current with a gravelly bottom as the best place to lay their eggs. They dig in it a round hole, sometimes of the depth of several inches by three feet in diameter: they place in the middle of this space, parallel with the current, a line of stones, the size of which varies with the size of the fish.

"The female then passes over the line of stones, gliding over, rubbing against or resting upon them. This she does again and again, some twenty or thirty times, till her eggs are all laid in the crevices of the gravel.

"When the female has done this, the male, in the same manner, by passing over and pressing upon the gravel, emits the milt, or soft roe, which covers and fecundates the eggs; then with tail, fins, head, and belly he works away till he manages to cover the eggs with gravel.

"Now a second female commences, and in the same manner lays her eggs in a parallel line with and against the first row. When the fecundation is complete, which is generally in about fifteen days, according to the number of fish, all unite in heaping up stones and gravel in mounds upon the eggs, in a manner resembling the great ant-hills that may be found near by.

"Mr. Géhin believes that their mason-work is, in a manner, cemented by a slimy secretion, with which they cover the stones, while incessantly rubbing over and pressing against them in heaping them up; for he found it difficult to destroy the mounds so formed by scratching apart the material with his fingers.

"The eggs remain in this way for a month or two, while the process of incubation goes on; at the end of a time,

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ing of fishes. The celebrated naturalist Milne Edwards, a member of the French Institute, was appointed by the government to examine the proceedings of these persons, and after an elaborate investigation, he made a report fully verifying their success. The attention of M. Coste, Professor in the College of France, had been drawn to this subject, and investigating it with admirable sagacity, he published his views, thus spreading before the world all the facts necessary to the actual and practical culture of fishes. The question of priority of discovery between various parties has given rise to some controversy, the result of which seems to be that Messrs. Géhin and Remy are entitled to the credit of having commenced, as early as 1842, the artificial fecundating of the eggs, and breeding fishes from them, this being the true point of discovery. That this could be done was of course known to naturalists so accomplished as Milne Edwards and Professor Coste,* and when they found it to be not only practicable, but practiced with positive success, they added the lights of science to the discovery, thus establishing and extending its utility. The experiments of Professor Coste, especially, were of the greatest practical importance, and the results of his investigations being published, speedily disseminated the knowledge which had been acquired, over the world. In France the government founded an establishment at Huningen, in the department of the Upper Rhine, which went into operation in 1852, and has been entirely successful in breeding fishes; being a government establishment, it supplies eggs of the best varieties to every department of France. The actual product of fishes by artificial breeding in France at the present time is great, and promises to be of the utmost national importance.

In England, Mr. Boccius, a civil engineer, appears to have been employed in the artificial breeding of fishes as early as 1841, that is, a year prior to the first attempts of Géhin and Remy, and being successful, had as early as 1842 hatched in various streams as many as two millions of trout. In 1853 the breeding of salmon was commenced at Stormontfield, near Perth, in Scotland, and the results were truly marvelous. In May, 1854, about two hundred thousand smolts, which had been hatched in the ponds, were put into streams connected with the sea. At this time they were about seven inches long, and weighed half an ounce to two ounces. In August they returned, and having been marked, were easily recognized. It was found after an absence of two months they had increased to three, five, seven, and even nine pounds in weight!

The fact that trout, salmon, pike, and other fishes may be thus artificially bred, and with enormous profit, is well established by these and many other experiments in different parts of Europe. Experiments have been made in this country, especially by Robert L. Pell, Esq., at Pelham, Ulster County, New York, and by Dr. T. Garlick and Prof. H. A. Ackley, of Cleveland, Ohio, and indeed by many others, verifying the general results which we have stated as having been ob-

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which Mr. Géhin could not precisely determine, the little fish appear about the size of pins, come out of their cells between the interstices of the gravel, and seek in the tranquil waters, near the shore, a place of safety.

"Having thus discovered nature's secrets, it remained to discover a mode of rendering them practically useful, and not until after many failures did Géhin and Remy hit upon a sure process, incontestably superior even to that of nature herself. This may be deemed too bold an assertion, but a moment's reflection will prove its truth."

* The discovery and practice of the artificial breeding of fishes date back as far as 1763, when the results of thirty years' research on the part of a German named Jacobi, were published in Hanover. In this memoir, it appears that the author proceeded upon an exact knowledge of the habits of trout, salmon, &c., and imitating them, he actually hatched and propagated fishes in nearly the same manner as was afterward done by Géhin and Remy, Professor Coste and others. The knowledge of these facts, certainly in the possession of scientific men, still appears to have lain practically dormant for nearly a century; but in 1837, Mr. Shaw, and soon after Mr. Boccius, commenced making experiments in England, probably instigated by the discoveries of Jacobi. They were entirely successful, and the result has been the actual breeding of fishes in Great Britain to a very large extent. The operations of Géhin and Remy began at a later date, that is, in 1842; but they proceeded without instruction from any extraneous source, and though not the first to discover and put in practice this new art, they were real inventors, and in consequence of the enlightened and energetic following up of their system by the French government, have been the means of a rapid dissemination of knowledge on the subject throughout the civilized world.

It appears by the late work on *Pisciculture*, by Eugène Noël, that in the *Encyclopédie Nouvelle*, published in Paris, in 1842, a note was added to the article *Organogénie*, by Dr. Serres, in which the following passage occurs: "The physiologist can put in a vase, eggs not fecundated, and in another zoosperms; in pouring the latter upon the former, he creates animals at will." Here seemed a general philosophic statement of the principle of the system of which we are treating.

It may be added that, according to the authority of M. Coste, it was by recourse to this method of multiplication that Messrs. Agassiz and Voght procured all the embryos necessary for their studies on the development of the *Palée*, a species of salmon in the Swiss lakes, the anatomical history of which these two naturalists published in 1842.

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tained in Europe.* The stocking of barren or impoverished rivers, lakes, and ponds by fishes artificially hatched, may be considered as not only a possibility in this country, but as a means of easy and certain supply, demanding the attention of patriots and statesmen.

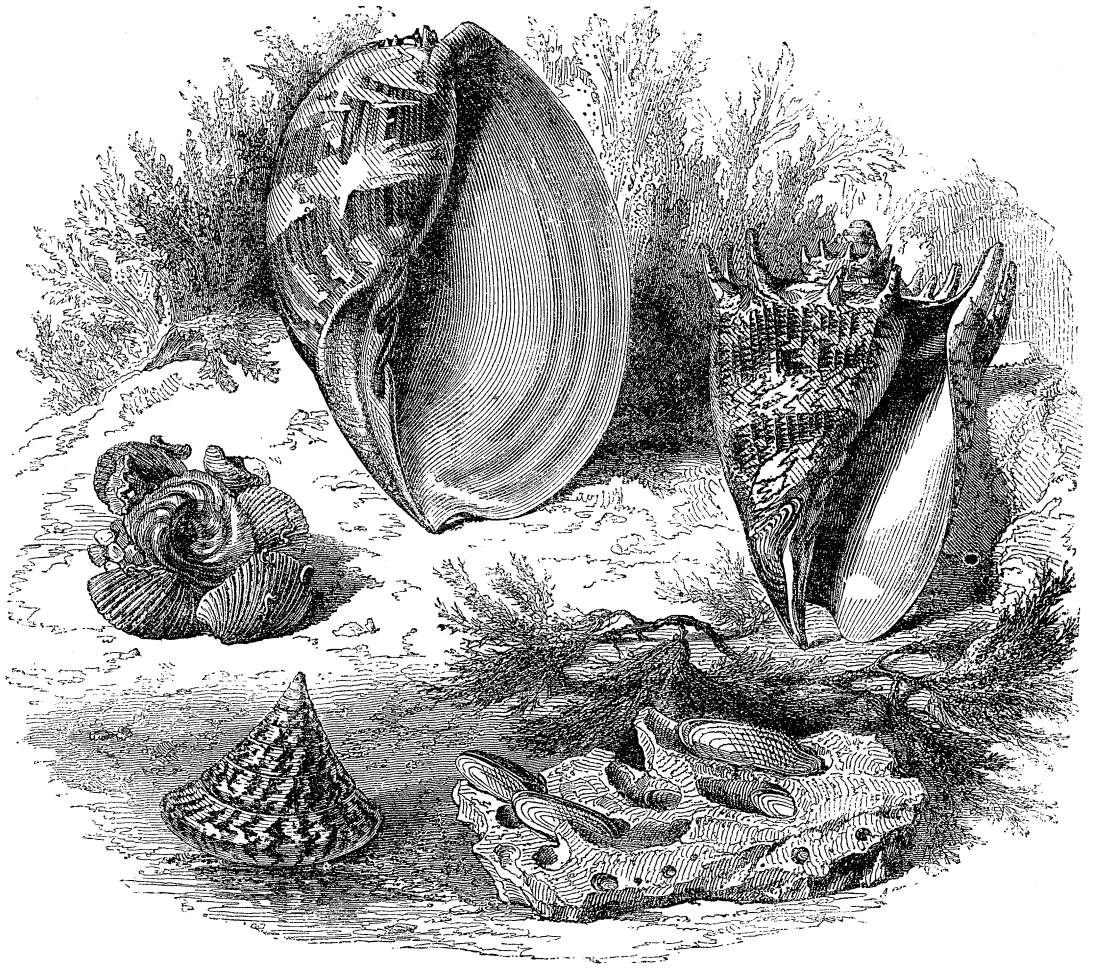
We cannot here enter into an account of the various methods adopted for the breeding of fishes, but must refer the reader to the work on this subject by W. H. Fry, Esq., published by Appleton & Co., 1854, and the still more recent publication by Dr. Garlick, of Cleveland, Ohio. We may state, however, that the new art of propagation has been successfully applied in Europe to the production of salmon, trout, shad, pike, carp, bream, barbel, tench, and perch, and in this country to several of these species. It is ascertained that all these fishes, filled with roe, and near their spawning-time, may be transported for hundreds of miles; the eggs of the female may be pressed out by the hand, and the milt, extracted in the same manner, strewn over them; thus prepared, they may be put in artificial or natural enclosures, with beds of gravel, and left to be hatched. The particular devices employed are various, but they are all simple. Some of the establishments in England and France are on a large scale, and the product is truly astonishing.†

* In the Transactions of the American Institute of the City of New York, for 1857, p. 439, will be found an interesting and instructive essay, by Mr. Pell, on American fishes and fish-breeding, by which it appears that he has met with the most entire success in the artificial breeding of various species. The experiments of Dr. Garlick and Professor Ackley have been chiefly made on the fishes of Lake Erie and the vicinity. Their method of proceeding appears to be alike practical and successful. They seem specially to note the following fishes as suitable for artificial propagation: the BLACK BASS, *Grystes nigricans* of Agassiz, or *Centrarchus fasciatus* of De Kay; the LARGE-MOUTHED BASS, *G. megastoma;* the WHITE BASS OR WHITE PERCH, *Labrax multilineatus;* the GRASS BASS, *Centrarchus hexacanthus;* ROCK BASS, *C. æneus;* and the *Common Pickerel, Yellow Perch, Sun-Fish,* and *Common Eel.*

† We find the following in the papers, April, 1859:

"A remarkable account has been lately given by Dr. Cloquet to the Paris Société d'Acclimation, of the results of an attempt to keep salmon in fresh-water ponds having no communication with the sea. The experiment was made near St. Cloud, where M. Coste has successfully carried on piscicultural operations on a very extensive scale. The pond chosen for the experiment in question is of small extent, and is supplied by a small stream of fresh water, sufficient to form a cascade. Three years ago the pond was entirely emptied and cleaned out. In April and May, 1855, several thousand salmon, only two months old, were placed in the pond with trout, and, notwithstanding the voracious nature of the latter fish, the salmon have prospered so well that a few weeks ago, in the presence of the emperor, who takes great interest in the artificial propagation of fish, no less than four hundred pounds' weight of salmon was caught by one haul of a net. This result is very surprising, but M. Coste states that he was far more astonished to find that the female salmon were full of eggs! He adds that he saw several eggs so highly developed that they were on the point of being emitted. These results, which bear the stamp of high authenticity, prove that salmon may be produced and reared in fresh-water ponds under similar circumstances to those by which trout are now so successfully multiplied in various waters around Paris."

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COCKLES. IMPERIAL VOLUTE. CROWN VOLUTE. PHOLAS. HELMET SHELL.

Division II. MOLLUSCA.

We now take leave of the Vertebrate Division of the Animal Kingdom, and enter upon another, formed upon altogether a different type. We have just quitted the fishes, properly so called, but we have not yet done with the sea, their home. Notwithstanding the infinite number of swimming fishes, there is still abundant room in the ocean and its accessories—bays, sounds, gulfs, rivers, and lakes—for another race of beings, infinitely diversified in form, and countless as the leaves of the forest.

The *Mollusca*, our present theme, bear the general name of *Shell-fish*, though they do not embrace all that is included in that title. Lobsters, crabs, prawns, and many other creatures that live in the sea, belong to another division: we now treat of oysters, clams, cockles, snails, mussels, and a variety of others, which produce the beautiful and diversified shells which ornament the cabinet of the conchologist. Though the study of these might seem little likely to afford amusement, we may remark that it is precisely here in this almost hidden and lost division of the animal kingdom, that we shall meet with some of the most interesting and instructive surprises. Every living creature has a history of its own; each has characteristics by which it may be known from its relatives; each has its own territory, its appropriate food, and its duties to perform in

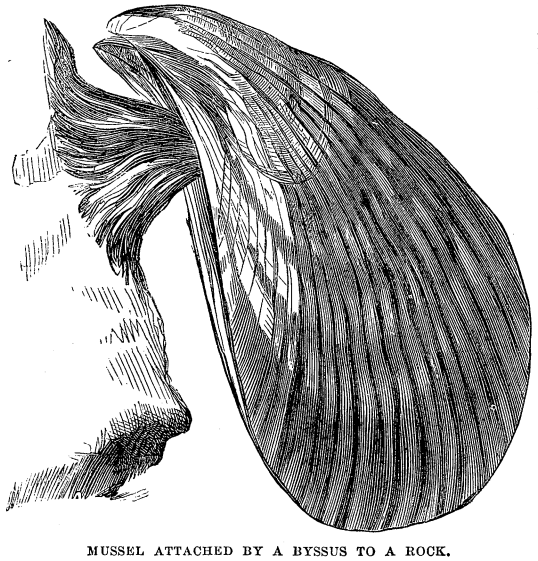
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the economy of nature. An account of these is their natural history, and this is likely to prove interesting, somewhat in proportion to the peculiarities of the creatures themselves, and the novelty of the revelations which their powers, instincts, and habits unfold.

Throughout all the classes of animals we have described, we have found an internal bony skeleton, forming the foundation for the whole structure of the body—limbs, flesh, muscles, and nerves. In the Mollusca the bodies are soft, and instead of having an internal bony support, they are mostly protected by a hard external shell. These soft bodies are enveloped in a muscular skin, which naturalists call the *mantle*, and it is this which by slow degrees secretes and supplies the shell. In some species the shell is of one piece, and is called *univalve;* in others the shell is double, the two parts being united by a hinge; this is called *bivalve.* The snail is a univalve, the oyster or clam a bivalve. Other shells, on account of their structure, are called *multivalve.* Many shells, as that of the oyster, are deposited in layers, a fine membrane interposing between each layer; they are therefore called *membraneous shells.* Most membraneous shells are lined with a brilliant enameled substance, called *nacre; mother of pearl* is the nacre of the pearl oyster. That of the fresh-water mussel is a beautiful azure. The other structure of shells is called *porcellaneous*, because they look like porcelain or china. The common *cowry* is a well-known instance of a porcellaneous shell. Some shells are so transparent as to resemble glass, and are therefore called *vitreous.*

Starting with these simple definitions, let us take a general survey of the field of inquiry which lies before us. We begin with the infancy of these animals, and we may remark that at this point in their lives, the various kinds of Mollusca are more alike both in appearance and habits than in after-life; the young fry of the aquatic races are, indeed, almost as different from their parents as the caterpillar from the butterfly. The analogy, however, is reversed in one respect; for whereas the adult shell-fish are often sedentary, or walk with becoming gravity, the young are all swimmers, and by means of their fins and the ocean-currents, they travel to long distances, and thus diffuse their races as far as suitable climate and conditions are found. Myriads of these little voyagers drift from the shores into the open sea and there perish; their tiny and fragile shells become part of a deposit that is forever increasing over the bed of the deep sea, at depths too great for any living thing to inhabit.

Some of these little creatures shelter themselves beneath the shell of their parent for a time; many can spin silken threads with which they moor themselves, and avoid being drifted away. They all have a protecting shell, and even the young bivalves have eyes at this period of their lives to aid them in choosing an appropriate locality. After a few days, or even less, of this sportive existence, the sedentary tribes settle down in the place they intend to occupy during the remainder of their lives. The tunicary cements itself to rock or sea-weed; the ship-worm adheres to timber, and the pholas and lithodomus to limestone rocks, in which they soon excavate a chamber which renders their first means of anchorage unnecessary. The mya and razor-fish burrow in sand or mud; the mussel and pinna spin a byssus; the oyster and spondylus attach themselves by spines or leafy expansions of their shell; the brachiopoda are all fixed by similar means, and even some of the gasteropods become voluntary prisoners, as the hipponyx and vermetus.

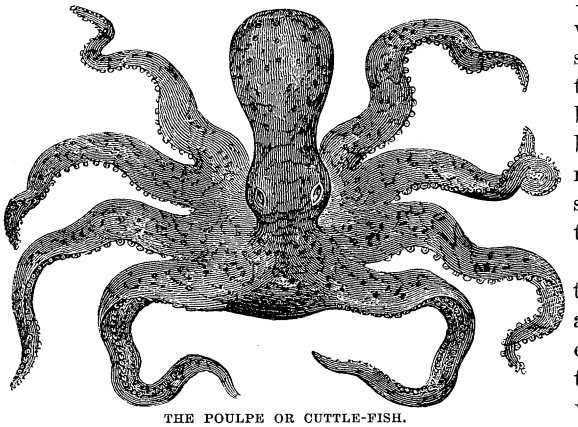


MUSSEL ATTACHED BY A BYSSUS TO A ROCK.

Other tribes retain the power of traveling at will, and shift their quarters periodically, or in search of food; the river-mussel drags itself slowly along by protruding and contracting its flexible

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foot; the cockle and trigonia have the foot bent, enabling them to make short leaps; the scallop swims rapidly by opening and shutting its tinted valves. Nearly all the gasteropods creep like the snail, though some are much more active than others; the pond-snails can glide along the surface of the water, shell-downward; the nucleobranches and pteropods swim in the open sea.



THE POULPE OR CUTTLE-FISH.

The cuttle-fishes have a strange mode of walking, head-downward, on their outspread arms; they can also swim with their fins, or with their webbed arms, or by expelling the water forcibly from their branchial chamber; one species of calamary can even strike the surface of the sea with its tail, and dart into the air like the flying-fish.

By these means the mollusca have spread themselves over every part of the habitable globe; every region has its tribe, every situation its appropriate species; the land-snails frequent moist places, or woods, or sunny banks and rocks, climb trees, or burrow in the ground. The air-breathing limneids live in fresh water, only coming occasionally to the surface; and the auriculas live on the sea-shore, or in salt marshes. In the sea each zone of depth has its molluscous fauna. The limpet and periwinkle live between tide-marks, where they are left dry twice a day; the trochi and purpuræ are found at low water among the sea-weed; the mussel affects muddy shores; the cockle rejoices in extensive sandy flats. Most of the finely-colored shells of the tropics are found in shallow water, or among the breakers. Oyster-banks are usually in three or four fathom water; scallop-banks at twenty fathoms. Deepest of all the terebratulæ are found, commonly at fifty fathoms, and sometimes at one hundred fathoms, even in polar seas. The fairy-like pteropoda, the oceanic snail, and multitudes of other floating molluscs, pass their lives on the open sea, forever out of sight of land; while the lisiopa and scyllæa follow the gulf-weed in its voyages, and feed upon the green delusive banks.

The food of the mollusca is either vegetable, infusorial, or animal. All the land-snails are vegetable-feeders, and their depredations are but too well known to the gardener and farmer; many a crop has been wasted by the ravages of the small gray slug. They have their likings, too, for particular plants: most of the pea-tribe and cabbage-tribe are favorites, but they hold white mustard in abhorrence, and fast or shift their quarters while that crop is on the ground. Some, like the cellar-snail, feed on cryptogamic vegetation, or on decaying leaves; and the slugs are attracted by fungi, or any odorous substances. The round-mouthed sea-snails are nearly all vegetarians, and are consequently limited to the shore and the shallow waters in which sea-weeds grow. Beyond fifteen fathoms, almost the only vegetable production is the nullipore; but here corals and horny zoophytes take the place of algæ, and afford a more nutritious diet.

The whole of the bivalves, and other headless shell-fish, live on infusoria, or on microscopic vegetables, brought to them by the current which their ciliary apparatus perpetually excites; such, too, must be the sustenance of the magilus, sunk in its coral bed, and of the calyptræa, fettered to its birth-place by its calcareous foot.

The carnivorous tribes prey chiefly on other shell-fish, or on zoophytes, since, with the exception of the cuttle-fishes, their organization scarcely adapts them for pursuing and destroying other classes of animals. One remarkable exception is formed by the stylina, which lives parasitically on the star-fish and sea-urchin; and another by the testacelle, which preys on the common earth-worm, following it in its burrow, and wearing a buckler, which protects it in the rear.

Most of the siphonated univalves are animal-feeders; the carrion-eating stromb and whelk consume the fishes and other creatures whose remains are always plentiful on rough and rocky coasts. Many wage war on their own relatives, and take them by assault; the bivalve may close,

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and the operculated nerite retire into his home, but the enemy, with rasp-like tongue, armed with silicious teeth, files a hole through the shell—vain shield where instinct guides the attack! Of the myriads of small shells which the sea heaps up in every sheltered nook, a large proportion will be found thus bored by the whelks and purples; in many fossil-shell beds, nearly half the bivalves and sea-snails are perforated—the relics of antediluvian banquets.

This is on the shore, or on the bed of the sea; far away from land the carinaria and firola pursue the floating acalephe; and the argonaut, with his relative the spirula, both carnivorous, are found in the high seas in almost every quarter of the globe. The most active and rapacious of all are the calamaries and cuttles, who vindicate their high position in the naturalist's system by preying even on fishes.

As the shell-fish are great eaters, so in their turn they afford food to many other creatures—fulfilling the universal law of eating and being eaten. Civilized man still swallows the oyster, and with some the snails are still reckoned a dainty dish; mussels, cockles, and periwinkles are in great esteem with children and the other unsophisticated classes of society; and so are scallops and the haliotis, where they can be obtained. Two kinds of whelk are brought to the British markets in great quantities; the arms of the cuttle-fish are eaten by the Neapolitans, and also by the East Indians and Malays. In seasons of scarcity, vast quantities of shell-fish are consumed by the poor inhabitants of the European coasts. Still more are regularly collected for bait; the calamary is much used in the cod-fishery off Newfoundland, and the limpet, whelk, and clam on various coasts.

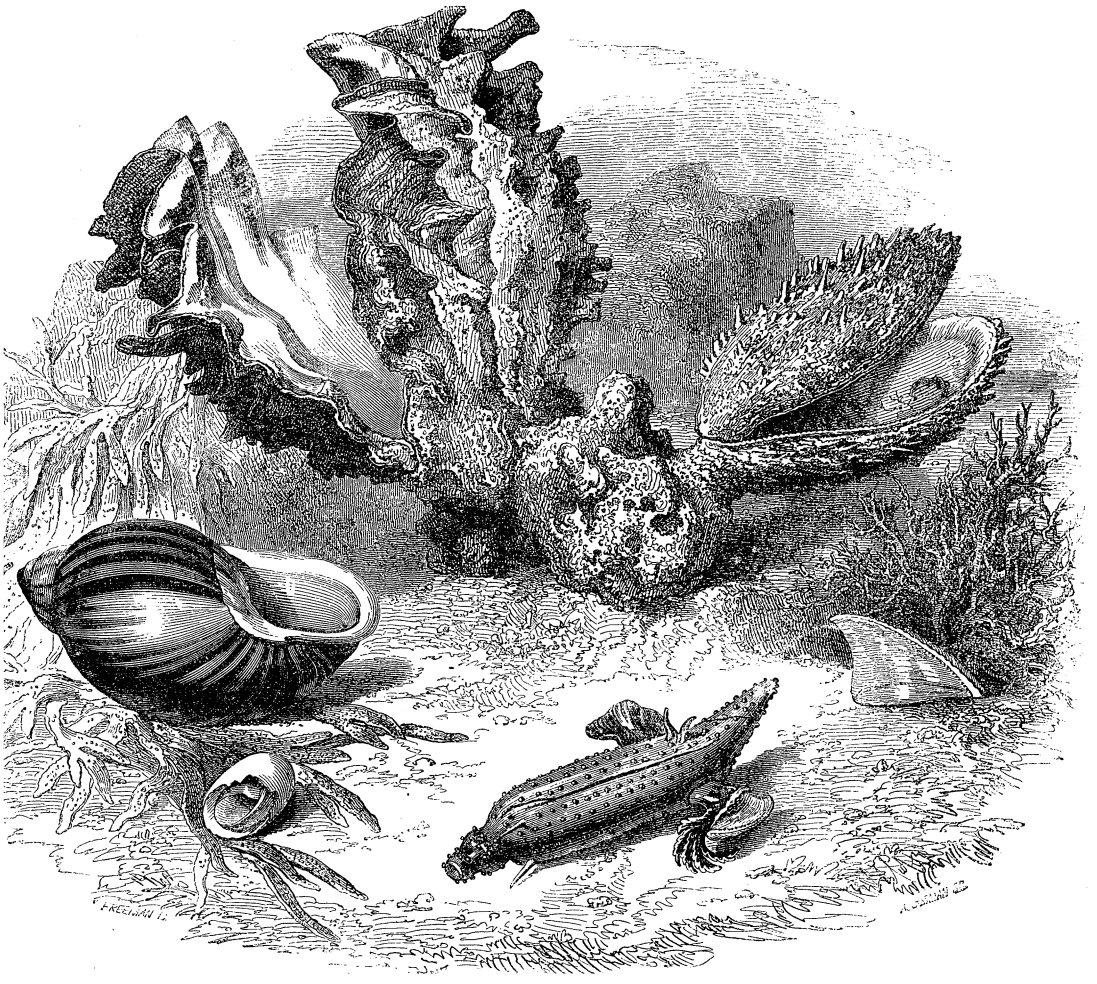
Many wild animals feed on shell-fish; the rat and the raccoon seek for them on the sea-shore when pressed by hunger; the South American otter and the crab-eating opossum constantly resort to salt marshes and the sea, and prey on the mollusca; the great whale lives habitually on the small floating pteropods; sea-fowl search for the littoral species at every ebbing tide; while, in their own element, the marine kinds are perpetually devoured by fishes. The haddock is a great conchologist, and some good northern sea-shells have been rescued, unbroken, from the stomach of the cod; while even the strong valves of the cyprina are not proof against the teeth of the cat-fish. Many species fall a prey even to animals much their inferiors in sagacity: the star-fish swallows the small bivalve entire, and dissolves the animal out of its shell; and the bubble-shell, itself predacious, is eaten both by star-fish and sea-anemone. The land-snails afford food to many birds, especially to the thrush tribe; and to some insects, for the luminous larva of the glow-worm lives on them, and some of the large predacious beetles occasionally kill slugs.

The greatest enemies of the Mollusca, however, are those of their own nation; scarcely one-half the shelly tribes graze peacefully on sea-weed, or subsist on the nutrient particles which the sea itself brings to their mouths; the rest browse on living zoophytes, or prey upon the vegetable feeders.

Yet in no class is the instinct of self-preservation stronger, nor the means of defense more adequate; their shells seem expressly given to compensate for the slowness of their movement and the dimness of their senses. The cuttle-fish escapes from attack by swimming backward and beclouding the water with an inky discharge; and the sea-hare pours out, when irritated, a copious purple fluid, formerly held to be poisonous. Others rely on passive resistance, or in concealment for their safety. It has been frequently remarked that molluscs resemble the hue and appearance of the situation they frequent; thus, the limpet is commonly overgrown with balani and sea-weed, and the ascidian with zoophytes, which form an effectual disguise; the lima and modiola spin together a screen of grotto-work. One ascidian, *A. cochligera*, coats itself with shell-sand, and the carrier-trochus cements shells and corals to the margin of its habitation, or so loads it with pebbles, that it looks like a little heap of stones.

It must be confessed that the instincts of the shell-fish are of a low order, being almost limited to self-preservation, the escape from danger, and the choice of food. Their history offers few of those marvels which the entomologist loves to relate. An instance of something like social feeling has been observed in a Roman snail, who, after escaping from a garden, returned to it in quest of his fellow-prisoner; but the accomplished naturalist who witnessed the circumstance, hesitated to record a thing so unexampled. The limpet, too, if we may trust the observations

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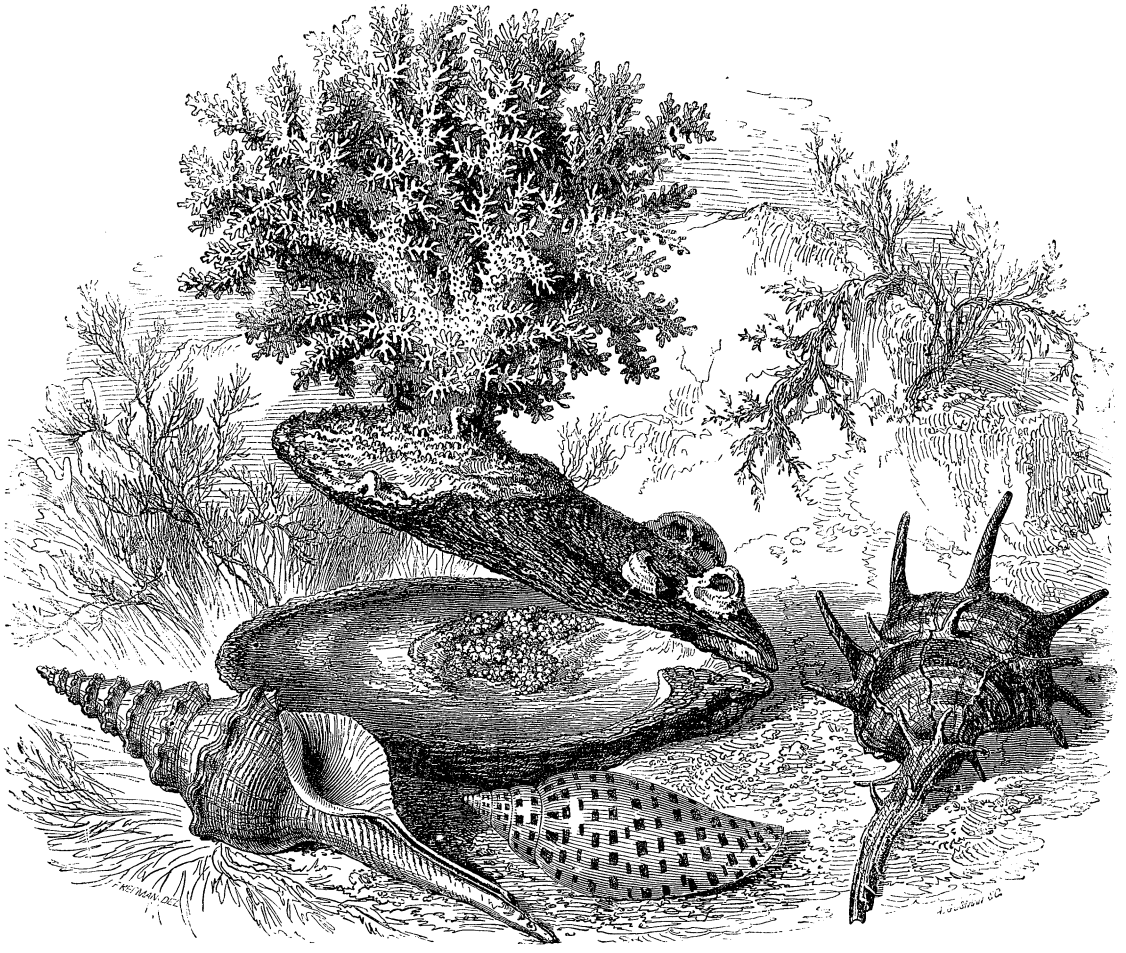
SNAIL-SHELL AND EGG. OSTREA AND SPONDYLUS. CARINARIA. VITREOUS CARINARIA.

of Mr. Robert of Lyme Regis, England, is fond of home, or at least possesses a knowledge of topography, and returns to the same roost after an excursion with each tide. Professor Forbes has immortalized the sagacity of the razor-fish, who submits to be salted in his hole rather than expose himself to be caught, after finding that the enemy is lying in wait for him.

We have spoken of shell-fish as articles of food, but they have other uses, even to man; they are the toys of children, who hear in them the roaring of the sea; they are the pride of collectors, whose wealth is in a cone or wentle-trap;* and they are the ornaments of barbarous tribes. The Friendly Islander wears the orange-cowry as a mark of chieftainship, and the New Zealander polishes the elenchus into an ornament more brilliant than the pearl ear-drop of classical or modern times. One of the most beautiful substances in nature is the shell-opal, formed of the

* Formerly, the study of shells, called *Conchology*, was a very fashionable pursuit. At that period enormous prices were paid for some particular shells. A Carinaria shell once brought five hundred dollars; it is now worth twenty cents. In 1701 a wentle-trap sold for two hundred dollars; in 1703, for one hundred dollars; it may now be had for one dollar. The prices of other shells have varied in a similar manner. Conchology, taking cognizance only of the shells, and not of the inhabitants that produced them and lived in them, was not a scientific study any more than that of collecting old Chinaware. It is the substitution of scientific zoology for mere shell-fancying, together with the frequency of remote voyages, which has made shells more common, and has wrought such a change in the value of these articles. Many of them, however, are intrinsically beautiful, and will always be objects of interest and value.

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FUSUS LONGISSIMUS. PEARL OYSTER AND CORAL. VOLUTE. THORNY WOODCOCK.

remains of the ammonite. The forms and colors of shells, as of all other objects, answer some particular purpose, or obey some general law; but besides this, there is much that seems specially intended for our study, and calculated to call forth enlightened admiration. Thus the tints of many shells are concealed during life by a dull external coat, and the pearly halls of the nautilus are seen by no other eyes than ours. Or, descending to mere utility, how many tracts of coast are destitute of limestone, but abound in shell-banks, which may be burned into lime; or in shell-sand, for the use of farmers.

Not much is known respecting the individual duration of shell-fish, though their length of life must be very variable. Many of the aquatic species are annuals, fulfilling the cycle of their existence in a single year; whole races are entombed in the wintry tide of mud that grows from year to year in the beds of rivers, lakes, and seas; thus, in the Wealden clay of England layer above layer of small river-snails are found, alternately with thin strata of sediment—the index of immeasurably distant years. Dredgers find that while the adults of some shell-fish can be taken at all seasons, others can be obtained late in the autumn or winter only, those caught in spring and summer being young, or half-grown; and it is a common remark that *dead* shells, of some species, can be obtained of a much larger size than any that we find alive, because they attain their full growth at a season when our researches are suspended. Some species require part of two years for their full development; the young of the doris and eolis are born in the summer time, in the warm shallows near the shore; on the approach of winter they retire

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to deeper water, and in the following spring return to the tidal rocks, attain their full growth early in the summer, and after spawning-time disappear.

The land-snails are mostly biennial; hatched in the summer and autumn, they are half-grown by the winter-time, and acquire their full growth in the following spring or summer. In confinement, a garden-snail will live for six or eight years; but in their natural state it is probable that a great many die in their second winter, for clusters of empty shells may be found, adhering to one another, under ivied walls, and in other sheltered situations; the animals having perished in their hybernation. Some of the spiral sea-shells live a great many years, and tell their age in a very plain and interesting manner, by the number of fringes on their whirls; the contour of the ranella and murex depends on the regular recurrence of these ornaments, which occur after the same intervals in well-fed individuals, as in their less fortunate kindred. The ammonites appear, by their whirls or periodic mouths, to have lived and continued growing for many years.

Many of the bivalves, like the mussel and cockle, attain their full growth in a year. The oyster continues enlarging his shell by annual shoots, for four or five years, and then ceases to grow outward; but very aged specimens may be found, especially in a fossil state, with shells an inch or two in thickness. The giant-clam, *tridacna*, which attains so large a size that poets and sculptors have made it the cradle of the sea-goddess, must enjoy an unusual longevity; living in the sheltered lagoons of coral islands, and not discursive in its habits, the corals grow up around, until it is often nearly buried by them; but although there seems to be no certain limit to its life, though it may live a century for all that we know, yet the time will probably come when it will be overgrown by its neighbors, or choked with sediment.

The fresh-water mollusca of cold climates bury themselves during winter in the mud of their ponds and rivers; and the land-snails hide themselves in the ground, or beneath moss and dead leaves. In warm climates they become torpid during the hottest and driest part of the year.*

The permanency of the shell-bearing races is effectually provided for by their extreme fecundity; and though exposed to a hundred dangers in their early life, enough survive to repeople the land and sea abundantly. The spawn of a single doris may contain six hundred thousand eggs; a river mussel has been estimated to produce three hundred thousand young in one season, and the oyster cannot be much less prolific. The land-snails have fewer enemies, and, fortunately, lay fewer eggs.

Finally, the Mollusca exhibit the same instinctive care with insects and the higher animals in placing their eggs in situations where they will be safe from injury, or open to the influences of air and heat, or surrounded by the food which the young will require. The tropical bulimi cement leaves together to protect and conceal their large, bird-like eggs; the slugs bury theirs in the ground; the oceanic-snail attaches them to a floating raft; and the argonaut carries them in her frail boat. The horny capsules of the whelk are clustered in groups, with spaces pervading the interior for the free passage of sea-water; and the nidamental ribbon of the doris and eolis is attached to a rock, or some solid surface from which it will not be detached by the waves. The river-mussel and cyclas carry their parental care still further, and nurse their young in their own mantle, or in a special marsupium, designed, like that of the opossum, to protect them until they are strong enough to shift for themselves.

In the Introduction to this work (Vol. I., pp. 21, 22) we have given a brief view of the structure and physiology of the Mollusca; inviting the reader's attention to the facts there given, we now proceed to describe some of the more interesting species of this great division of Animated Nature, arranging them, according to the Classification in Vol. I., pp. 27, 28, in seven classes: *Cephalopoda*, *Gasteropoda*, *Pteropoda*, *Palliobranchiata*, *Lamellibranchiata*, *Tunicata*, and *Bryozoa*.

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* See Introduction to "*Rudimentary Treatise on Recent and Fossil Shells, by S. P. Woodward,*" London, 1851, from which we have chiefly derived this general view of the Mollusca.

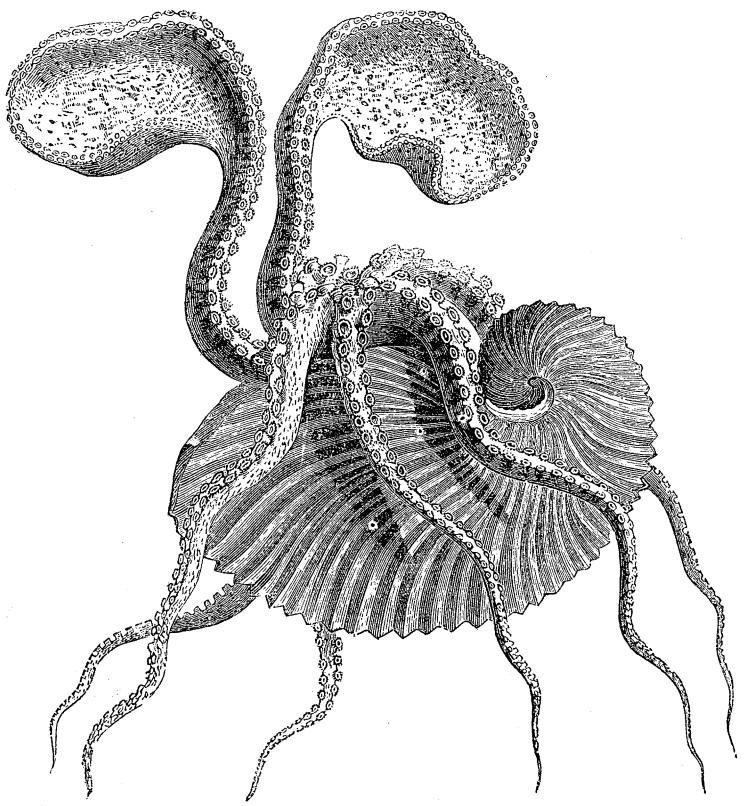
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Class I. CEPHALOPODA.

This term is derived from two Greek words, *kephalè*, a head, and *pous*, a foot, and refers to the fact that the animals of this class have the legs arranged around the head, and may therefore be called *head-footed*. These legs, it is true, are also arms, and being furnished with rows of sucking-cups, enable these animals to maintain a firm grasp of any object on which they lay hold. They breathe by means of branchiæ connected with a funnel or siphon, through which the water passes off. This arrangement answers a double purpose, for by expelling the water vigorously through this siphon, they propel themselves rapidly along, this being their common mode of swimming. They thus move backward, their eyes, however, being so situated as to command a view of the objects in their course. Some species possess fins, and some use their arms to aid them in swimming. In all the body is inclosed in a sac-like mantle, generally of thick, leathery skin, covered, however, with a delicate cuticle, which in some species displays the most brilliant colors. They are all oviparous. This class is divided into two orders, the *Dibranchiata* and *Tetrabranchiata*.

ORDER 1. DIBRANCHIATA.

This term, derived from the Greek *dis*, two, and the Latin *branchiæ*, gills, signifies animals having two gills. The order includes a great number of fossil as well as living species, distinguished for possessing two branchiæ, and a structure of body which enables them not only to swim rapidly through the water, but to creep with the head downward, upon the bottom of the sea. The shell is generally internal, and often merely rudimentary; if external it is not chambered. The arms are eight or ten in number, and furnished with sucking-discs, and the body is often supplied with a pair of fins. They are divided into two sections, the *Octopoda* and *Decapoda*.



ARGONAUT WITH THE SHELL.

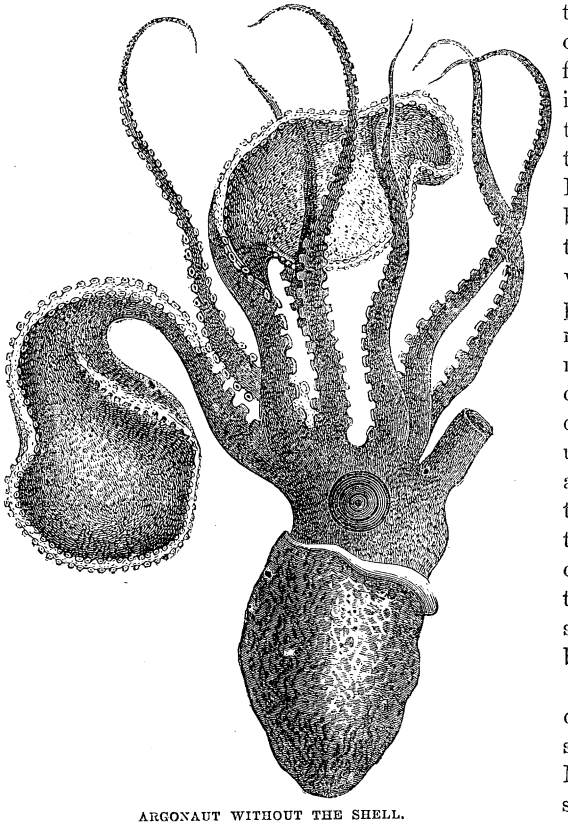
THE OCTOPODA.

These are furnished with eight arms or legs; two of which, in one genus, enable the animals to form shells, to which, however, the body is not attached; others are naked, having a slight trace of an internal shell. They are for the most part exceedingly active and voracious, and prey with avidity upon crustacea and fishes. They are provided with a sac containing a black and acrid fluid, which they eject into the water so as to obscure it and render it offensive, by means of which they escape from their enemies.

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Genus ARGONAUTA: *Argonauta.*—This includes the celebrated PAPER NAUTILUS or ARGONAUT, *A. argo.* This is a kind of poulpe or cuttle-fish, without any internal skeleton; it has eight arms, provided with suckers; two of them are expanded into broad membraneous webs, with which the little animal grasps its shell when it is swimming, and by means of which it forms and secretes its shell. Formerly these were supposed to be sails, which it spread to the breeze, and by means of which it sailed over the sea. This idea, which has often been introduced in the poetry of ancient and modern times, is now known to be erroneous. The shell of the argonaut is deeply grooved, and is very thin, transparent, and so flexible when wet that the sides may be pressed together. The form is exceedingly beautiful, being somewhat boat-shaped, and the little creature floats in it in such a manner that some authors have supposed the art of navigation was derived from it. When the creature sinks to the bottom it crawls upon its legs, carrying its house on its back, like a snail.

The Argonaut has no muscular attachment to its shell, whence it was formerly supposed that the animal took up its residence in a cast-off tenement, as does the hermit-crab; the fact is now well ascertained that its shell is formed by the membranes above mentioned, which have the power of secreting the substance of which they are composed. It has been discovered that if the shell be broken, the animal will set to work with its two hands or trowels to mend it; that it will not only close up cracks, but supply parts that are broken away, with the same material as that which composed the original fabric. In repairing its shell it will even take advantage of pieces of shell that come in its way, and solder them in to fill up a crevice. It appears that the little animal is extremely sensitive, and sometimes in fright it becomes separated from the shell, and consequently dies; it however occasionally quits its tenement voluntarily, and again resumes it. When in its shell there is a considerable vacuum at the bottom.



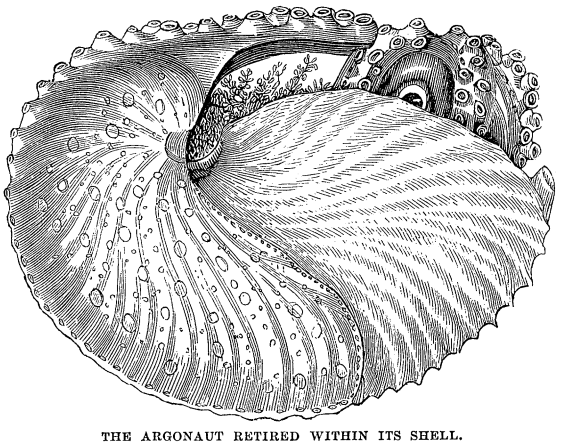
ARGONAUT WITHOUT THE SHELL.

We are indebted for some careful and curious observations on this interesting species to Madame Power, who resided at Messina, and for several years devoted herself to the study of these animals. In order to determine whether the shells really were produced by these creatures, she placed twenty-six of them in a vessel and broke the shells in different ways. She had the satisfaction of seeing them immediately proceed to cover the broken parts with the sails, and by wrinkling them upon the parts, close the fractures. The first day the new substance was thin and delicate as a cobweb, but it thickened and hardened gradually, until in about thirteen days it had become perfectly firm, and shelly as the unwounded part, though somewhat more opaque.

The Argonaut is a native of various seas, but it is most common in the Mediterranean, and especially in the vicinity of Messina; here it is found, even in the port, all the year, but is most abundant in autumn, and in the muddy parts of the bay, where the boats lie thickest. When on the surface, if they observe any person, they fold the sail-arms over the shell, dispose the rowing arms within it, and sink. If they happen to be beneath, when alarmed, they eject their ink,

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to gain time to hide themselves in the mud. Those in the cages of Madame Power, after the ink-bag was emptied, would, if still pursued, spirt water from the funnel, then shrink within the shell, covered with the sails. When calm and quiet, and unconscious of being observed, they would exhibit their many beauties, rowing along with their arms, their full sails tinged with elegant colors, resting their extremities on the two sides of the shell, or embracing it with them. When pressed by hunger they would come almost to the surface, and when Madame Power offered them food, they would snatch it out of her hands and greedily devour it. The eggs are like millet-seeds, perfectly transparent, attached by filaments of brilliant gluten to a common stem of the same. Three days after the eggs had been discovered, the little poulpes were observed in the shell of the parent, without any shell, like small worms. Soon after they began to show buds with two rows of points on them, the rudiments of the arms and suckers; the sail arms appeared first by several days. On the sixth day the first vestige of a shell was seen, very thin and flexible. The eggs are found in the interior of the spire of the parent, the young between the roof of the spire and the mantle; the infant shell seems to be first deposited in the end of its parent's spire, whose form it thus assumes; but after a while it carries on the process without aid. Two or three eggs are developed at a time; when the young are about three-quarters of an inch in length, they inclose themselves in the spire of the parent, where they remain four days to acquire the shell; three days more they remain under the body of the old one, and are then ejected.



THE ARGONAUT RETIRED WITHIN ITS SHELL.

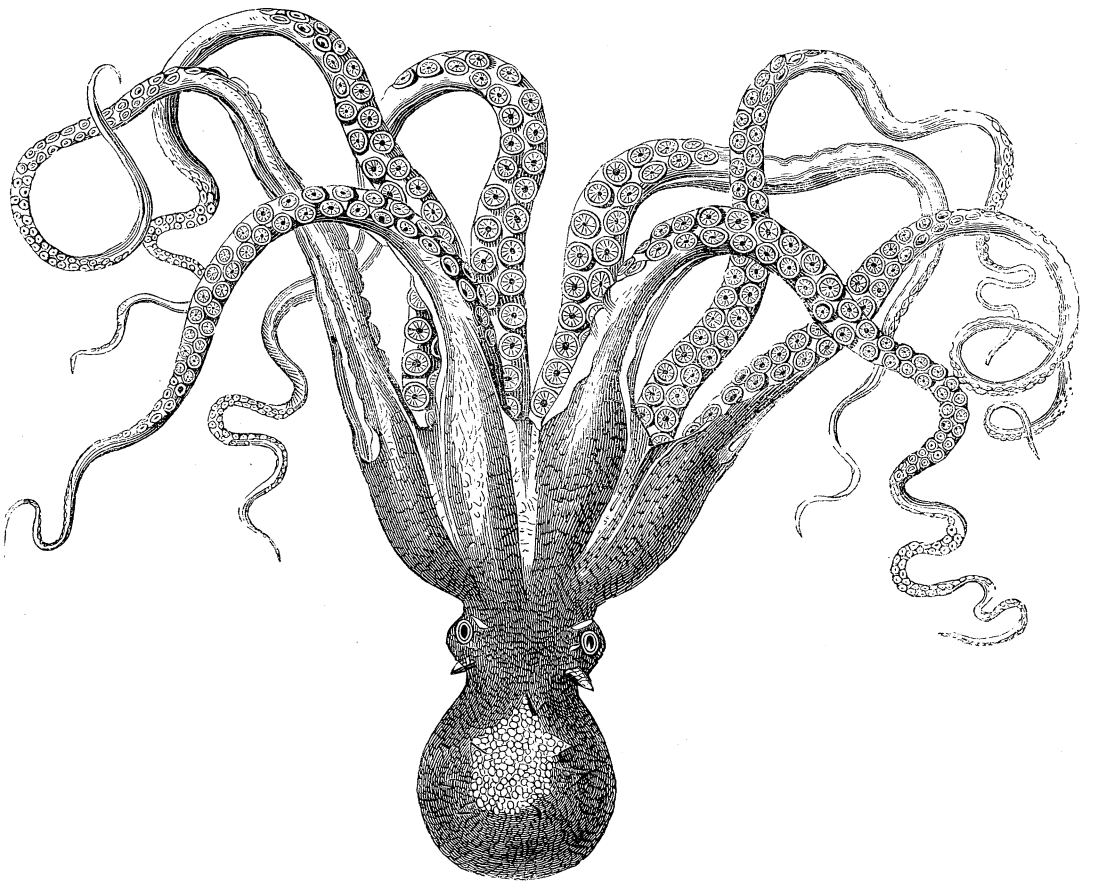
It is a very curious fact that all the argonauts hitherto found are females, whence it is supposed that the males are of a different form, and without shells. It has been, indeed, suggested that the *Hectocotyles*, hitherto regarded as parasitic worms, are really male argonauts.

Four species of argonaut are known, all, however, closely resembling this which we have described: they inhabit the open sea throughout the warm parts of the globe. Captain King took several from the stomach of a dolphin caught eighteen hundred miles from land.

Genus OCTOPUS: *Octopus.*—This includes the EIGHT-ARMED CUTTLE-FISH, *O. vulgaris*, anciently called *Polypus*, which has been abbreviated into the popular title *Poulpe*. It has no shell, and no skeleton, but has two conical pieces of horny substance imbedded in the back, one on each side. The body, which has a globular form, is a soft, jelly-like substance, covered with a thick, dark-colored, leathery skin. The arms or legs are eight in number, and are very long, sometimes having an expanse of five feet; but even in a specimen of this size, the head and body would not be over a foot long. The animal moves with its head either up or down; when it walks on the ground or on the bottom of the sea, it is in the latter position. (See p. 498.) The arms are each furnished with one hundred and twenty pairs of sucking-cups, making nearly two thousand in all; by means of these they are able to maintain a powerful grasp upon their prey; indeed the arms may sooner be wrenched off than forced to loose their hold. If, however, they are thus torn asunder, they are soon replaced by spontaneous growth. The arms of this species are esteemed good food by some of the people around the Mediterranean, where it is common.

The eye of the cuttle-fish is large and exceedingly keen-sighted; the whole body of the creature is phosphorescent in the dark, and the eyes shine like those of a cat. The mouth is placed in the space inclosed by the arms; it consists of a thick circular lip around an orifice; beneath this lip, and partially appearing through the orifice, is a beak like that of a parrot, excepting that the short mandible is the uppermost; these mandibles do not cover bone, but their interior is filled with a fibrous substance of great strength and solidity. The muscles in which

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THE POULPE OR EIGHT-ARMED CUTTLE-FISH.

the jaws are imbedded, and by which they are worked, are extremely powerful; the jaws are, in fact, capable of stripping off the armor from crabs and lobsters, and of cutting up the flesh of fishes. Within the mandibles is a fleshy tongue, invested with a papillose membrane of delicate texture, and also armed with recurved horny papillæ, so that the tongue by its vermiform action, is easily enabled to transmit the food into the gullet, which passes through a ring in the cranial cartilage, dilates into a spacious crop with glandular walls, whence a short canal leads to a strong, muscular gizzard, lined with a leathery skin. In this gizzard the food is ground to pulp.

In addition to its other extraordinary endowments, the cuttle-fish is supplied with an ink-bag enfolded in the mass of the liver, containing the substance called *sepia*, and formerly used, it is said, by the Chinese, in making Indian-ink. The creature has the power of ejecting this through its siphons placed on the left side of the abdomen, so as to render it an effectual means of defense. Powerful as it is, however, for the destruction of various kinds of sea animals, it has enemies superior in strength to itself, such as the grampus, the cachalot, &c. When its quick eyes perceive one of these huge monsters approaching, it ejects a quantity of its inky fluid into the water, which immediately spreads around into a dark cloud; while the enemy is floundering about, bewildered and astonished, in this murky fog, the nimble cuttle darts away and conceals himself in the mud at the bottom, or the safe fissure of some neighboring rock.

The use of this ink-battery as a means alike of defensive and offensive warfare, is evinced by an anecdote of a British officer, who on a certain occasion, had gone ashore to collect shells, happening to be attired in a pair of snow-white pantaloons. As he was walking about, he suddenly came upon a cuttle-fish, snugly harbored in the recess of a rock. For a moment the two stared at

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MR. BEALE AND THE POULPE.

each other with mutual surprise; after a time the officer advanced a little, when, quick as thought, the poulpe discharged a spray of ink, and taking good aim at the snowy pants, spattered them with indelible stains, which rendered them, ever after, unpresentable.

This species seems to be widely distributed in almost all seas. In the North Atlantic it is usually of small size, but in the Mediterranean it is sometimes so large as to weigh a hundred pounds; the body of one has been seen of the size of a barrel, and with arms as thick as those of a man. In the tropical seas they are said to be much larger, and so fierce as sometimes to attack boats and drag them under water. We are told that in the Indian waters, such things have actually happened, and in certain localities the boatmen always keep themselves supplied with axes to cut off the arms of these monsters, in case of an attack. Their remarkable spirit, as well as their strength, is evinced by an adventure which Mr. Beale, an Englishman, had with one of them among the rocks of the Bonin Islands, where he had gone ashore to seek for shells. As he was moving about, he was suddenly arrested by seeing at his feet a most extraordinary looking animal, crawling toward the surf, which it had only just left. It was creeping on its eight legs, which, from their soft and flexible nature, bent considerably under the weight of its body, so that it was lifted by the efforts of its tentacula only a small distance from the rocks. It appeared much alarmed at seeing him, and made every effort to escape. Mr. Beale endeavored to stop it by pressing on one of its legs with his foot; but, although he used considerable force for that purpose, its strength was so great that it several times liberated its member in spite of all the efforts he could employ on the wet and slippery rocks. He then laid hold on one of the tentacles with his hand and held it firmly, so that it appeared as if the limb would be torn asunder by the united efforts of himself and the creature. He then gave it a powerful jerk, wishing to disengage it from the rocks to which it clung so forcibly by its suckers. This effort it effectually resisted; but the moment after, the apparently enraged animal lifted its head with its large projecting eyes, and loosing its hold of the rocks, suddenly sprang upon Mr. Beale's

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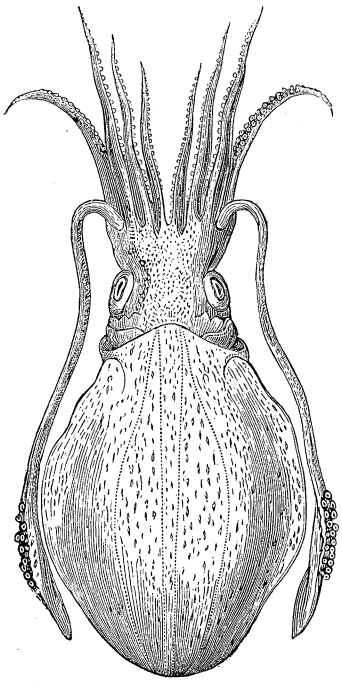
arm, and clung to it by means of its suckers with great power, endeavoring to get its beak, which could now be seen between the roots of its arms, in a position to bite. A sensation of horror pervaded his whole frame, when he found that this hideous animal had fixed itself so firmly on his arm. Its cold, slimy grasp was extremely sickening; and he loudly called to the captain, who was at some distance, to come and release him from his disgusting assailant. The captain quickly came, and taking him down to the boat, during which time Mr. Beale was employed in keeping the beak of the octopus away from his hand, soon released him, by destroying his tormentor with the boat-knife, which he accomplished by cutting away portions at a time.

There are several other species of this genus; among them is the *O. moschatus*, found in the Mediterranean, and having a strong musky smell. The species of the genus *Eledone*, have only a single row of suckers on each arm. In these the head and body are even shorter and rounder than in the *O. vulgaris*.

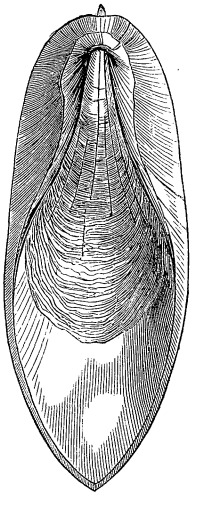
THE DECAPODA.

These animals resemble the preceding, but instead of eight arms or tentacles, they have ten, two of them usually much longer than the others; they are retractile, of a cylindrical form, and provided with suckers at the extremity. Some are furnished with an internal bony support, and some have a chambered shell.

Genus SEPIA: *Sepia.*—This includes the Common European Cuttle-Fish, *S. officinalis*, which is twelve to eighteen inches long; the skin smooth, whitish, and spotted with brown and purple; it has an internal support of a calcareous nature, and formed in laminæ; this is the well-known *cuttle-fish bone*, used for cage-birds, and also for making *pounce*; when reduced to powder, it is employed as a mould for fine castings. The eyes of this species are strong and hard, and when extracted, of a brilliant pearly tint; in some parts of Southern Europe, they are worn as necklaces instead of pearls. It is exceedingly fierce and voracious, and from its depredations on the fishes inclosed in floating nets, is a source of great annoyance and serious loss to the fishermen. From its wariness and agility, however, it is difficult of capture. A writer on this subject says: "We well remember in our youth, going far out with an old fisherman of Dawlish to visit his floating nets, which he had laid for the pilchards. As we looked down into the clear blue water, we could see that the number of fish entangled was great; but to the great discomfiture of the fisherman, who was eloquent on the occasion, almost every other fish was locked in the embraces of a cuttle-fish, plying his parrot-like mandibles to some purpose. The fisherman, who seemed to regard these unbidden guests as an incarnation of all evil, carried a capacious landing-net, but so quick was the sight of these Cephalopods, so ready were they in letting go, and agile in darting back and sideways, clear of the net, that though the greedy creatures held on to the last moment, the fisherman did not secure above three out of the crowds that had spoiled his haul."



THE COMMON CUTTLE-FISH.



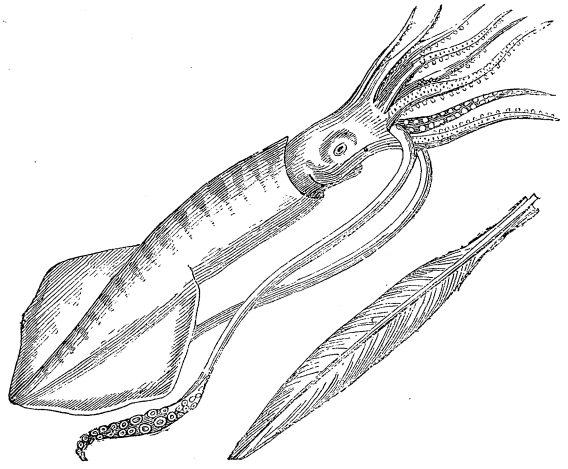
BONE OF THE CUTTLE-FISH.

This species is common on the coasts of Europe, and is abundant around the British shores. There are several other species distributed in various seas.

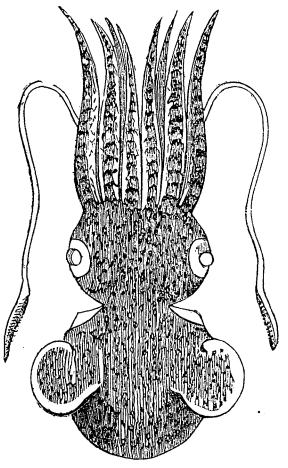
Genus LOLIGO: *Loligo.*—This includes several species, called *Squids*, and also *Calamaries*, from the shape of the bony plate of the back, which resembles a quill-pen, *calamus* in Latin, and

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hence popularized into *calamary*. They are also sometimes called *Sleeve-Fish*, from their resemblance in shape to the sleeve of a coat. These animals have an elongated form, with broad fins at the apex of the body. They are exceedingly active, and are common in the Atlantic, as well as other seas. They are of various brilliant colors, vivid red, deep blue, violet, brown, and orange, and these tints are constantly changing at the will of the animal.



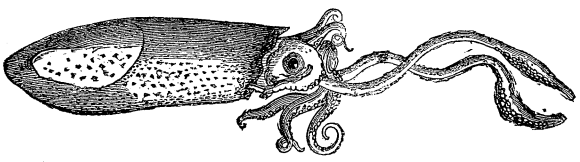
THE COMMON CALAMARY AND PEN.



THE SEPIOLA.

The PEN-FISH or COMMON CALAMARY, *L. vulgaris*, is the best-known species of the genus: the body is somewhat pellucid, of a greenish hue, changeable to dirty brown; the eyes are large and lustrous, of an emerald green, phosphoric and fiery in a high degree. It is common in the European seas, and was known to the ancient Greeks and Romans. It is distinguished as a species by the fins forming a lozenge at the extremity of the sac. It is a very prolific animal, and the eggs are of a very singular and curious appearance: they are deposited in the form of numerous lengthened groups, radiating from a common center, and spreading every way into a circular form; each egg is of a glassy transparency, and the young animal may be very distinctly observed in each, many days before the period of exclusion. These groups of the eggs of the calamary are often seen swimming on the surface, and are occasionally thrown on shore; the whole group sometimes measures more than a foot in diameter, and from its general appearance, unless closely inspected, is often mistaken for a species of medusa or sea-blubber. These clusters are found to contain thirty to forty thousand eggs each. The pen-fish is a good swimmer, and crawls head downward on its oval disk. Shells, and sometimes sea-weed, have been found in its stomach.

The *Loligo punctata* is four to six inches long, and like the rest of the family, has ten arms; the body is cylindrical and tapering, and about three inches in length, being covered with reddish rounded spots of various sizes. The usual mode of progression is by dilating the body and filling it with water; it is then suddenly contracted, and the water forcibly ejected, so as to propel the animal backward with great rapidity, shooting like an arrow through the water. It feeds greedily on small shell-fish and crabs, of which it devours great numbers. This species is very common on our coasts. Lesueur notices six other species from Massachusetts to South Carolina. One of these, the *L. brevipinna*, is a small species, the body three to four inches long, beak prominent and horny; the long arms slender, and terminating in a point.

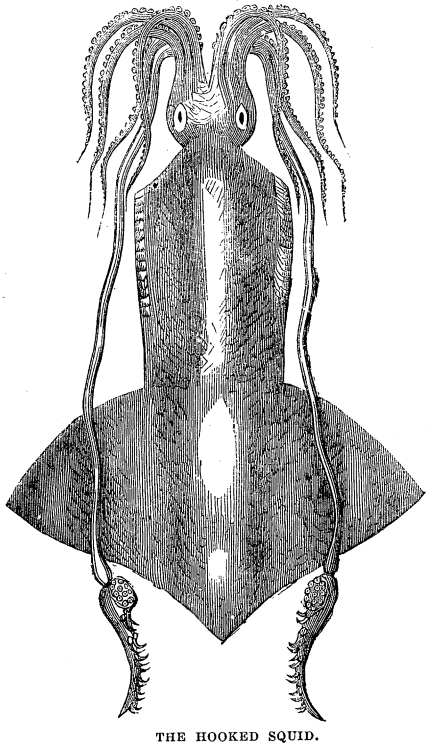


THE LOLIGO BREVIPINNA.

Genus SEPIOLA: *Sepiola*.—Of this there are several species in the Atlantic, Indian, and Pacific Oceans. They are two to four inches long.

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Genus OMMASTREPHES: *Ommastrephes.*—This includes the SAGITTATED CALAMARIES—called *Sea-Arrows* by the sailors—two inches to nearly a foot long. Of these there are more than a dozen species, frequenting the open sea in all climates. They are to a great extent the food of the dolphins and cachalots, as well as the albatrosses and penguins. One species is very extensively used as bait for the codfisheries of Newfoundland, and is more successful than any other. To procure this squid, men go out in boats in July and August to a certain part of the harbor of St. John's, where the animal is always more abundant than at any other spot; they are provided with *squid-jiggers*, a formidable apparatus consisting of about a dozen hooks, three inches long, so soldered together in the shank that the points radiate in all directions. These are not baited, but dropped into the water, one line in each hand, and are jerked up and down with a uniform motion. To see from the shore a line of boats, with a hundred and fifty men standing side by side, all with their elbows see-sawing together, is quite amusing. The animals are hooked of course in any part of the body, and when drawn up from the water, their first impulse is to eject their copious stream of ink. This is done in about a quarter of a minute after leaving the water, and the fishermen, from long habit, are sufficiently expert to take them from the jigger and throw them into the boat before they perform this action, or to hold them in such a manner that the funnel shall point outward, and the liquor be discharged into the sea. A slight warning is given, however, by a contraction of the animal the moment previous. A novice at the employment is sure to be grievously defiled. An amusing anecdote is current in respect to a young English captain, making some pretensions to fashion, who had been decoyed by some rogues of fishermen to accompany them one morning on a squid-jigging excursion. Utterly unconscious of any peculiarity, he went, and the wicked fellows suffered him with much complacency to draw up the first squid: but lo! in taking it from the hooks a torrent of ink was poured over his face, frilled shirt, and white waistcoat, descending in long streams even to his boots. It needs scarcely to be observed, that this votary of the Graces henceforward relinquished squid-jigging to more congenial souls.



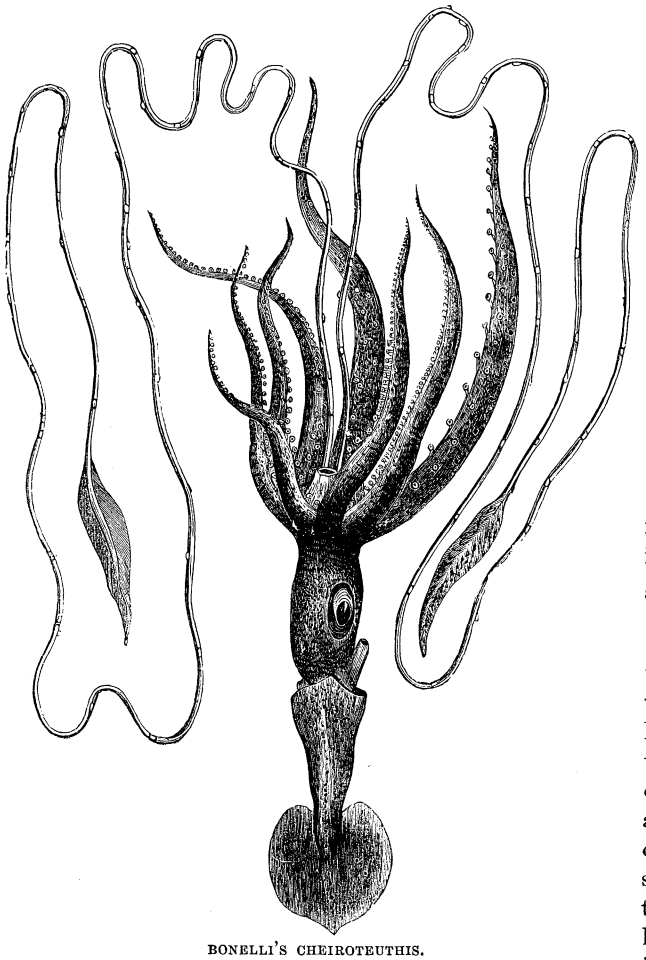
THE HOOKED SQUID.

It seems to be a species of this genus which, under the name of *Flying-Squid*, is mentioned by Mr. F. D. Bennett as numerous in the vicinity of the Sandwich Islands, where it is considered a luxury by all classes, and when fresh and well cooked, is excellent food, in consistence and flavor not unlike a lobster's claw. This species has the power of taking flying leaps out of its native element; Mr. Bennett says that in latitude 28° to 31° north, and longitude 154° to 161° west, flying-fish, and, nearly allied to these in their movements, flying-squids, were also numerous. During a calm the latter appeared in larger flights than they had ever been before witnessed, persecuted probably by the albicores; they rose from the sea in large flocks, leaping over its smooth surface, much in the same manner, and to the same height and distance as the flying-fish. Many of them were captured by birds during their leaps, and one individual, in making a desperate effort to escape some aquatic pursuer, sprang to a considerable height above the bulwarks of the ship, and fell with violence on the deck.

Genus ONYCHOTEUTHIS: *Onychoteuthis.*—Of this there are several species, found in the Mediterranean and in the Pacific Ocean. In Cook's first voyage the dead carcass of a gigantic species was found floating in the sea between Cape Horn and the Polynesian Islands; it was surrounded by sea-birds, which were busily devouring it.

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This species is called the HOOKED SQUID, *O. Banksii.* Its length from the tail to the end of the tentacles is six feet. The two largest of these are furnished with suckers and hooks, which enable the animal to seize its slippery prey with a powerful grasp. It appears that these creatures are not only of large size, but are truly formidable; the natives of the islands of the Pacific who dive for shell-fish have a great dread of them.



BONELLI'S CHEIROTEUTHIS.

Genus CHEIROTEUTHIS: *Cheiroteuthis.*—Of this there are two species in the Atlantic and Mediterranean. One of these, BONELLI'S CHEIROTEUTHIS, *C. Bonelli*, has the body eight inches long, and the longest tentacles nearly three feet.

The Cephalopoda seem to constitute a favorite form of existence in the operations of nature. Not only are the forms greatly diversified, but the species, swarming in almost every part of the ocean, are infinitely multiplied. Nevertheless, in former ages of the world analogous species were still more abundant than are the present ones. Of those kinds called *Belemites*, which are now all extinct, the vestiges of nearly a hundred species have been discovered, distributed throughout Europe. The soft parts of these animals have perished ages ago, and there now remain only the internal shells or pens, somewhat resembling those of the living calamaries. Impressions, however, of belemites are preserved in some fine-grained strata, from which it has been ascertained that they resembled the loligo in form, their arms having been furnished with sharp hooks instead of suckers. It is supposed that these animals lived near shores where they were in danger of striking against rocks and other fixed objects; the shells had a provision to prevent injuries from such a source.

ORDER 2. **TETRABRANCHIATA.**

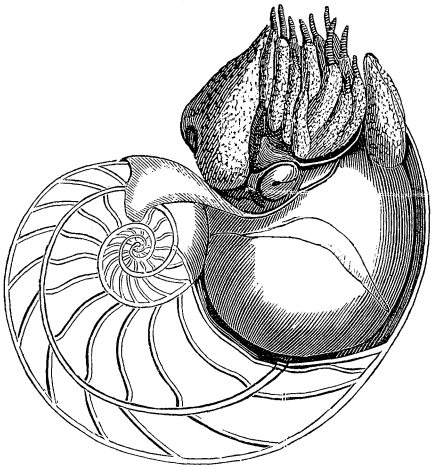
This term, from the Greek *tetra*, four, and the Latin *branchia*, a gill, alludes to the possession of four gills by the several species of the order. The only existing kinds are those of the genus *Nautilus*, of which three or four species are found in the Persian, Chinese, and Indian seas; all the rest have perished, and are only known by their shells, which, however, are amazingly abundant. All these animals resembled the cuttle-fishes; they were carnivorous, and appear to have served by their devastations to keep within bounds the mollusks, crustaceans, and fishes that teemed in the waters of remote geological periods. They are divided into two families, the *Nautilidæ* and *Ammonitidæ.*

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THE NAUTILIDÆ.

Of this there are many genera and species, all fossil but the following:

Genus NAUTILUS: *Nautilus.*—This includes the PEARLY NAUTILUS, *N. Pompilius:* it has four branchiæ, and an external shell of a beautiful pearly texture and color, to which the animal is permanently attached. This shell consists of a series of chambers, pierced through the middle by a tube or siphuncle, which extends to the remotest cell. The body and limbs of the nautilus resemble in some respects those of the poulpe, and are contained in the outer receptacle of the shell; it maintains a vital connection with the inner chambers by means of a membraneous tube which lines the siphuncle, passing through the internal vacancies, these being merely air-chambers to give the whole the necessary specific gravity, so as to float or sink in the water at the animal's pleasure. It lives in deep water,* and feeds at the bottom of the sea, where it crawls about, carrying its house on its back like a snail. It feeds on small crustacea and other sea-animals. It is sometimes seen floating on the surface of the water, the head and tentacles spread out, and the shell riding like a boat. This species, and two or three others closely resembling it, are found in the Asiatic seas.

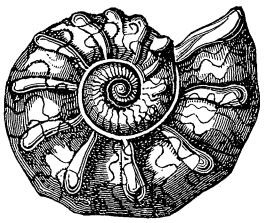


SECTION OF A NAUTILUS SHOWING ITS INTERIOR.

The shells of a hundred extinct species, found in Europe, America, and Asia, are known to the geologists.

THE AMMONITIDÆ.

These are all fossil species, but they are so remarkable as to demand notice. They were of various forms, but they were of carnivorous habits, resembling the sepias, and, like the nautili, living in chambered shells. These shells are found in various situations in vast numbers, from the size of a pin's head to the diameter of the largest cart-wheel. No less than five hundred species are known. They appear to have attracted attention from a very early date, and to have been the source of many curious speculations. The name of *Cornu Ammonis* was given them from a fancied resemblance to the horns with which the head of Jupiter Ammon was sculptured; hence they are called *Ammonites.* In the earlier times their origin was variously accounted for. Some thought them petrifactions of real rams' horns, taking the name above mentioned in a strict sense; others thought they were the curled tails of certain animals; some took them for petrified marine worms rolled up; others saw in them coiled serpents, whence they were called *snake-stones.* The legends of the saints invested them with a sacred interest:



AMMONITE.

> "Of thousand snakes, each one
> Was changed into a coil of stone
> When holy Hilda pray'd."

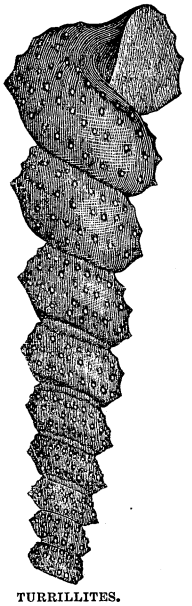
And the prayer, we are told, was not only followed by petrifaction, but by decapitation. There is a similar tradition of St. Keyna, who, when she found herself in a wood at Keynsham, between

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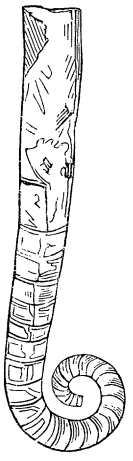
* By *deep water* naturalists and dredgers seldom mean more than twenty-five fathoms, a comparatively small depth, only found near coasts and islands. At one hundred fathoms the pressure exceeds two hundred and sixty-five pounds to the square inch. Empty bottles, securely corked, and sunk with weights beyond one hundred fathoms, are always crushed. If filled with liquid, the cork is driven in, and the liquid replaced by salt water; and in drawing the bottle up again, the cork is returned to the neck of the bottle, generally in a reversed position.

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Bath and Bristol, England, surrounded by serpents, changed them by the fervor of her devotion into headless stones. Nor were these opinions confined to the mere vulgar. Wormius described ammonites as petrified adders; Langius considered them to be either the vertebræ of serpents or convoluted marine insects. These notions were not lost on the dealers; and there are few fossil collections which do not even now possess what is called "a perfect *Cornu Ammonis*," that is, an Ammonite with a carved serpent's head ingeniously fitted on to the fossil shell. Some learned men considered them as freaks of nature, formed by the plastic power of the earth. The ancients held them in high estimation as very sacred, and of the highest value to the dreamer. At the present day these shells, aside from their use as curiosities for the conchologist and the geologist, serve no other purpose than to increase the volume of the rocks and strata of the earth. But in the age in which these creatures were all living in the sea, swarming by millions, many of them of truly gigantic dimensions, and all of carnivorous and predacious habits, what a spectacle of devastation must they have presented!



TURRILLITES.



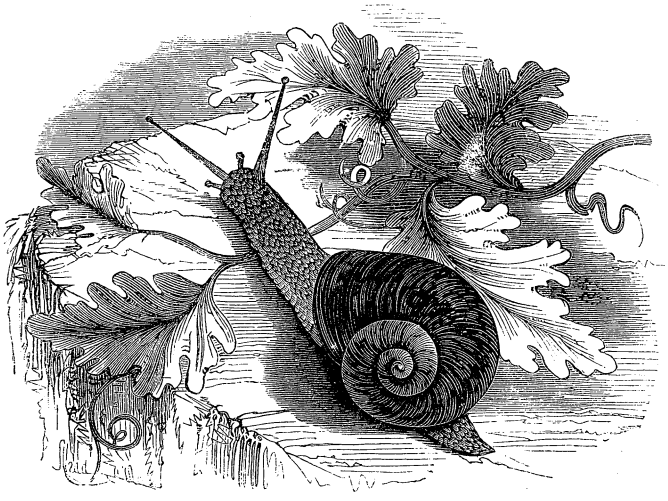
LITUITES.

Besides the common form of a convoluted or twisted horn, presented by the extinct animals we have described, there were others of different shapes, to which the names of *Lituites*, *Turrilites*, &c., have been given.

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Class II. GASTEROPODA.

This term, derived from the Greek *gaster*, the belly, and *pous*, foot, signifies *belly-walkers*. The organ by which they move, as is shown in the common snail, consists of a broad, muscular, disk-like foot, attached to the ventral surface, upon which the animal creeps very slowly with a gliding motion. The muscular movements may be seen following each other in rapid waves, when a snail is climbing a pane of glass. There are numerous species, which greatly vary in form. All, however, have a distinct head; respiration is effected by branchiæ, or a pulmonary sac; the organs of the senses are tentacles of various forms; the eyes are usually placed at the ends of tentacles situated upon the head.



THE COMMON SNAIL.

No special organs of taste or smell have been detected, but there is good reason, from the discrimination these animals show in the selection of their food, for believing that they possess them. The general form of the body is characteristic of the class; from the preponderance of one side of the body, the whole, during growth, acquires a spiral form; it is only in some naked species that we find the body symmetrical. Most of the Gasteropoda close the aperture of their shell by a horny or calcareous plate, called the *operculum*. Most of the species are oviparous; a few are ovo-viviparous. The sexes are generally separate, but many are hermaphrodites. The young are always provided with a shell while in the egg. These animals are divided into three orders, the *Pulmonifera*, *Branchifera*, and *Heteropoda*.

ORDER 1. PULMONIFERA.

This term, from the Latin, *pulmo*, a lung, and *fero*, to bear, refers to the fact that the animals of this order breathe air by means of lungs, and not water by means of branchiæ. It includes several species popularly known under the name of *Snails* and *Slugs*.

THE HELICIDÆ.

Genus HELIX: *Helix.*—To this belongs the COMMON GARDEN-SNAIL, *H. aspera.* This is furnished with four tentacula, two of which are smaller than the others; at the end of these, which the animal pushes out or draws back like telescopes, are blackish knobs, which are the eyes. It lays eggs about the size of peas, which are of a soft transparent substance. By closely examining with a magnifying lens, the young snail may be seen in the egg, with its embryo shell on its back. The snail is extremely tenacious of life, in evidence of which numerous examples have been cited; among them is the following, which is furnished by Mrs. Loudon: a Mr. S. Simon, a merchant of Dublin, whose father, a Fellow of the Royal Society, and a lover of natural history, left him a small collection of fossils and other curiosities, had, among them, the shells of some snails. About fifteen years after his father's death, he gave to his son, a child of ten years old, some of these snail-shells to play with. The boy placed them in a flower-pot, which

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he filled with water, and the next day put them into a basin. Having occasion to use this, Mr. Simon observed that the animals had come out of their shells. He examined the child respecting them, and was assured that they were the same which had been in the cabinet.

But the most interesting example of resuscitation occurred to a specimen of the Desert-snail, from Egypt, chronicled by Dr. Baird. This individual was fixed to a tablet in the British Museum on the 25th of March, 1846, and on March 7th, 1850, it was observed that he must have come out of his shell in the interval, as the paper had been discolored, apparently in his attempt to get away; but finding escape impossible, he had again retired, closing his aperture with the usual glistening film; this led to his immersion in tepid water, and marvelous recovery. "He is now," says our authority, March 13th, 1850, "alive and flourishing, and has sat for his portrait."

The reproduction of snails is most curious; at a certain time of the year, according to the account of Mrs. Loudon, they meet in pairs, and stationing themselves an inch or two apart, they launch at each other several little darts, not quite half an inch long. These are of a horny substance, and sharply pointed at one end. The animals, during the breeding season, are furnished with a little reservoir for them, situated in the neck, and opening on the right side. After the discharge of the first dart, the wounded snail immediately retaliates on its aggressor by ejecting at it a similar one; the other renews the battle, and in turn is again wounded. Thus are the darts of Cupid, metaphorical with all the rest of the creation, completely realized in snails. After the combat they embrace each other, and both lay eggs!

The manner in which a snail increases the size of its shell and mends it in case of fracture, is thus described by Réaumur, and it is the more interesting, as it illustrates the mode of proceeding, in these cases, of many other mollusca: "When a testaceous animal is about to enlarge its shell, the common snail, for instance, and its body has become too large to be covered securely, it projects a portion of its body from the opening; it then attaches itself to a wall or other solid substance, and the naked part is soon covered with the fluids which are excreted from its surface; the pellicle, or covering, which they produce, when the fluid dries, is, at first, thin and elastic, but gradually assumes more consistence, and becomes at last similar to the whole part of the shell. If, in this stage of the process, a bit of the shell is broken off and removed without injuring the body of the animal, the skin of the snail is soon covered with a fluid which gradually thickens and becomes solid. In about twenty-four hours after the operation, a fine crust may be observed, which constitutes the first and external layer for repairing the breach that has been made; at the end of some days this layer becomes solid, and in ten or twelve days, under favorable circumstances, the new piece of shell has acquired the same thickness as that which was removed, but it never unites in the same way, being only as it were a plug. If, after the broken piece has been removed, particularly if the fracture is made near the edge of the opening, the animal is not supplied with a sufficient quantity of nourishment, its bulk is gradually diminished, and now finding what is left of the shell equal to completely cover its lessened body, no exertion takes place for the production of a new portion. It is obvious, snails, &c., cannot enlarge in volume but by the augmentation of the whorls, and that each previous turn of the spire remains the same in length; these make a great difference in the size of the shell, by the last and additional one, each being calculated to contain nearly double that of the preceding one; but in many shells, both marine and river, the last whorls of the spire, compared with the preceding ones, greatly exceed this proportion. In some, the external opening is twelve times greater, or from eight to twelve; this depends entirely on the increase of the animal's body, and the duration of that increase."

The Edible Snail, *H. pomatia*, grows to a large size, nearly that of a man's fist. This was highly prized by the ancient Romans, for the table; they fattened it with great care in a large building, called a *Cochlearia*, where thousands of them were kept and fed with meal and new wine, boiled down. Varro says the shells of some of them would hold ten quarts. In Italy and France, at the present day, millions of these snails are fattened and brought to market, being used especially during lent, as they are not forbidden by "the Church." Another common European species is the Banded Snail, *H. memoralis*.

Snails are widely distributed over most parts of the world; sometimes, after a shower, they

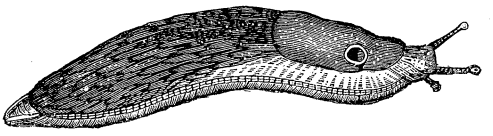
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are so abundant in Europe, as to have given rise to the popular idea that it has *rained snails.* In some intertropical countries there are species with exceedingly beautiful shells.

Snails are less numerous in this country than in Europe, though we have in the United States over sixty known species. One of the largest and most common among us is the *H. albolabris;* this deposits its eggs in light mould by the side of rocks and logs; in twenty or thirty days the young snail issues forth with a shell containing one whorl and a half. In October this species cease to feed, close the aperture by secreting over it a thin membrane, place the operculum uppermost, and remain torpid till spring. Other American species are the *H. alternata*, abounding in ditches and moist places; *H. monodon*, usually living in pairs, and found in open fields under stones, or in rotten wood in forests, &c., &c.

THE LIMACIDÆ.

Genus LIMAX: *Limax.*—This includes several species, called *Slugs;* these resemble snails in the form of the body, in the number and structure of the tentacles, and in their habits; but their shell is very small or rudimentary, and usually concealed in the interior of the mantle. Many of these species are very destructive in the gardens and fields, and a multitude of devices have been adopted for their destruction. The RED SLUG, *L. rufus*, is a very abundant species, and in Europe a broth made of it is used for diseases of the chest. The BLACK SLUG, *L. nigrescens*, and GRAY SLUG, *L. griseus*, are also common European species. The *L. agrestis* is an American species one and a half inches long, feeding on succulent leaves, and is often found on the under side of decayed leaves and trunks lying on the ground. Other species are *L. flavus*, two to two and a half inches long, and *L. campestris*, an inch long, &c.



THE RED SLUG.

THE LIMNÆIDÆ.

These, which are called POND SNAILS, inhabit fresh waters in all parts of the world: they feed chiefly on decaying leaves, and deposit their spawn, in the form of oblong, transparent masses, on aquatic plants and stones. There are several minute species in this country.

ORDER 2. **BRANCHIFERA.**

This order derives its name from the Latin *branchiæ*, gills, and *fero*, to bear, and is divided into two groups or sub-orders, the *Prosobranchiata*, and the *Opisthobranchiata.*

THE PROSOBRANCHIATA.

This term is compounded of the Greek *proso*, anterior, and *branchiæ*, gills, and includes a great number of species, all, however, possessing shells, usually spiral, within which they can retract themselves at pleasure. On account of the anterior position of the gills, the blood flows back toward the breast, and the auricle of the latter organ is placed in front of the ventricle. This division includes a great number of families, some of which we shall very briefly notice.

THE CYPRÆIDÆ, OR COWRIES.

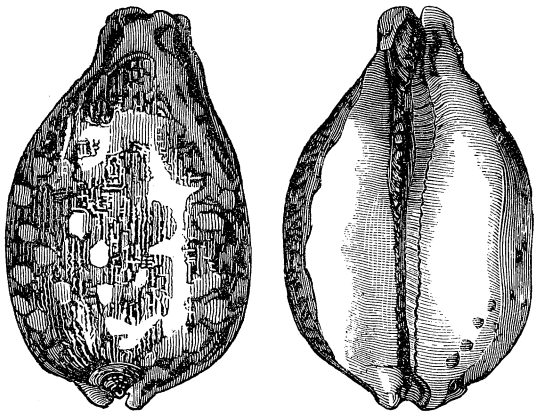
In this family the shells are convolute, highly enameled, and many of them are beautifully colored. The animal has a broad foot, truncated in front, and a mantle expanded on each side. There are one hundred and fifty living species; they are found in all warm seas, except on the east coast of South America; they generally live in shallow water near the shore, and feed on zoophytes.

Genus CYPRÆA: *Cypræa*, includes the *C. annulus*, used by the Asiatic Islanders to weight their fishing-nets and for barter. Mr. Layard found species of it in the ruins of Nimroud.

The MONEY COWRY, *C. moneta*, is a native of the Pacific and Eastern seas, and is used as money by the natives on the coast of Western Africa. These are collected in immense quantities by the British and taken to Africa to be disposed of to the negroes. In 1849,

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three hundred tons of them were imported into Liverpool for this purpose. The MAP COWRY, *C. mappa*, found in the Indian Ocean, is handsomely marked. Other species are the TIGER COWRY, MOLE COWRY, CHILDREN'S COWRY, BLOTCHED COWRY, &c.

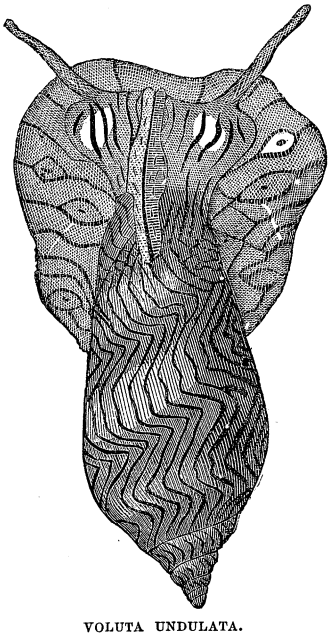


THE MAP COWRY.

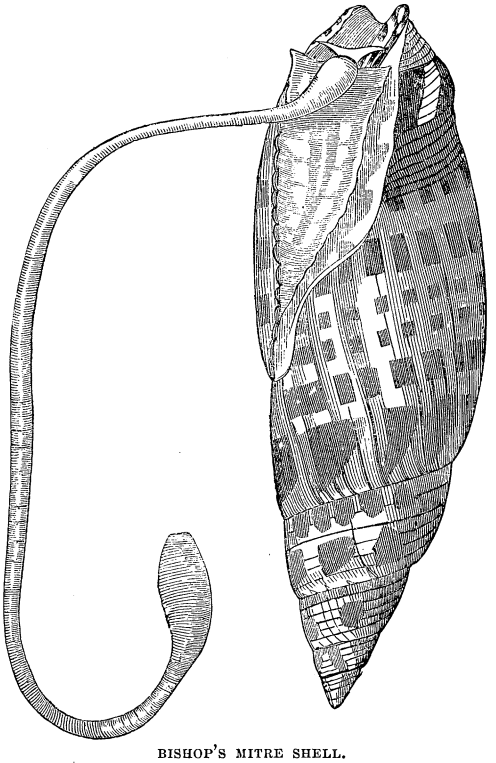
Besides the living ones, there are seventy-eight known species of fossil Cypræidæ.

THE CONIDÆ.

These have the shell inversely conical; in the animal the head is produced, the tentacles far apart, and eyes on the tentacles. There are two hundred and sixty-nine known species, found in all tropical seas. They inhabit fissures and holes of rocks, and the warm and shallow pools inside of coral reefs. They move slowly, and sometimes bite when handled. All are predacious. Some of the shells are beautiful, and have been sold for enormous prices.



VOLUTA UNDULATA.



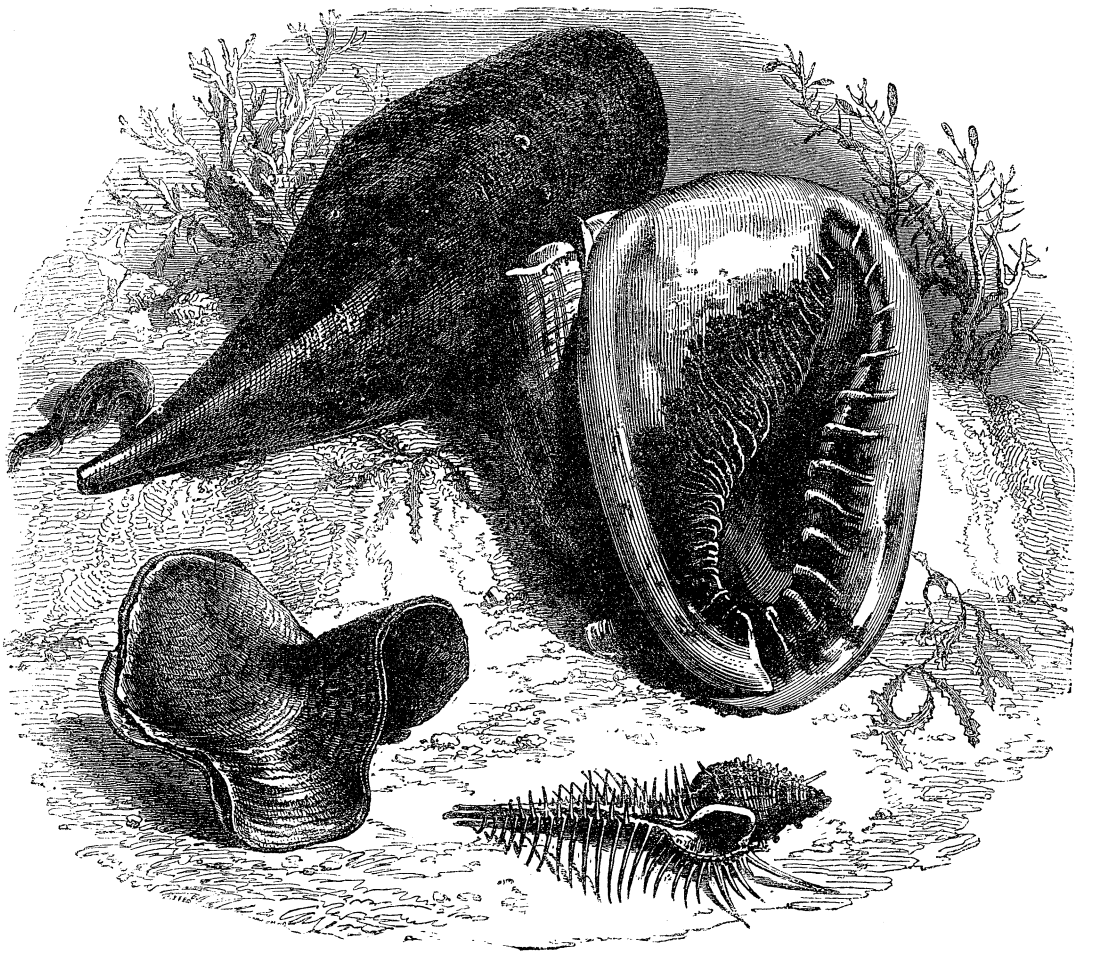
BISHOP'S MITRE SHELL.

THE VOLUTIDÆ

Genus VOLUTA: *Voluta.*—This includes numerous living as well as fossil species; among the former are the *V. undulata*, *V. musica*, *V. vespertilio*, *V. Brasiliana*, &c. Many of the Volutidæ are very beautifully marked.

Genus MITRA: *Mitra*, includes the *Mitre Shells*, one of which, the BISHOP'S MITRE SHELL, *M. episcopalis*, is noted for a very long proboscis, sometimes twice the length of the shell. The latter is turretted, smooth, white, and spotted with light red. It is found in the seas of the East Indies and some of the Polynesian Islands.

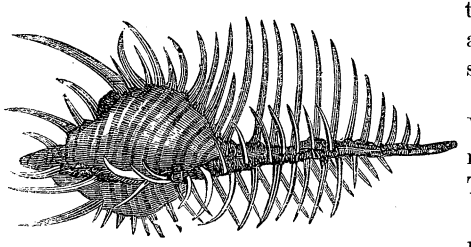
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SHELL FROM MALABAR. LARGE MUSSEL. FROM THE MEDITERRANEAN. THORNED MUREX. LARGE HELMET SHELL. FROM MADAGASCAR.

THE MURICIDÆ.

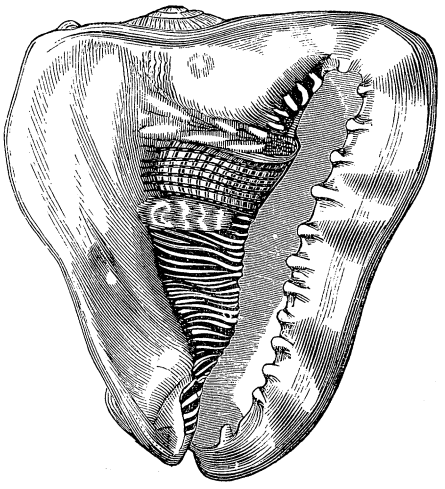
This is a very extensive family, some of the species being furnished with a long proboscis, with which they bore through the shells of other mollusca, and thus suck out the juices and destroy the animal within. The foot is broad, and adapted to crawling; the tentacles are short, and sometimes bear the eyes. All are marine and predatory; the shells are usually ornamented with spines; some assume very singular forms, and many are of very beautiful colors. The ancients obtained their purple dye from these animals; heaps of the shells may be still seen on the rocks of the Tyrian shores, and also on the coasts of the Morea, where it appears they were used in the same manner as by the Tyrians. One hundred and eighty living and one hundred and sixty fossil species are known.



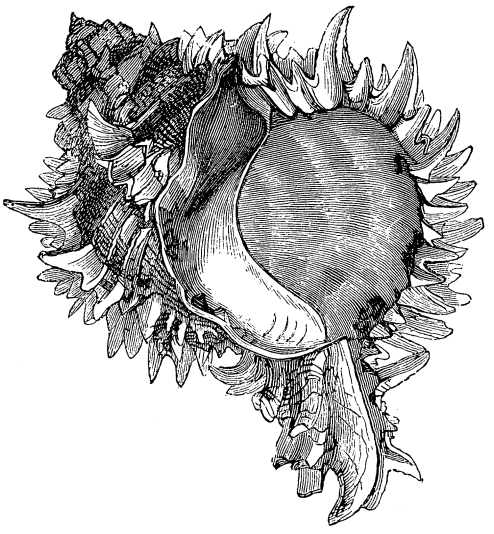
THE THORNY WOODCOCK.

Genus MUREX: *Murex*.—This includes the Sting-Winkle or Hedge-Hog Murex, *M. erinaceus*, common in the English Channel. The shell of the Thorny Woodcock, *M. tribulus*, sometimes called *Venus's Comb*, is much prized by collectors, if in a perfect state; it is often very delicate and beautiful. This is a native of the Moluccas and parts of the Indian Ocean. The *M. regius* is found on the west coast of Central America, and surpasses

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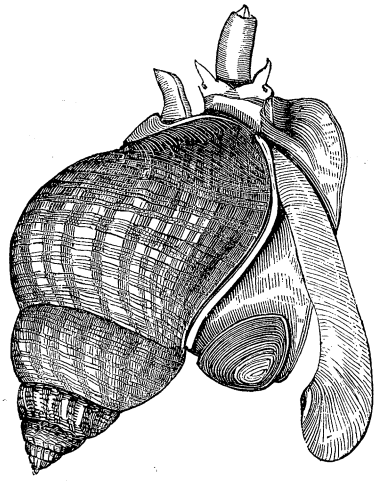
THE CASSIS TUBEROSA.



THE MUREX REGIUS.

all power of description in the beauty of its colorings. The large *Helmet-Shells*, of the genus *Cassis*, are extensively used in the manufacture of cameos.

Genus BUCCINUM: *Buccinum*, includes several species, of which the COMMON WHELK, *B. undatum*, is the type; this is extensively caught in dredges in Europe, as it is eaten, and is also used as fish-bait. It is well known to bore through the shells of other mollusca, and thus to suck out the vital parts. A curious illustration of this habit is furnished by Mr. Stephenson, in describing the erection of the Light-house on the Bell Rock, off the Southwestern coast of England. On the first landing of the workmen there, the limpets, of a very large size, were common, but were soon picked up for bait. As they disappeared, an effort was made to plant a colony of mussels, from beds at the mouth of the river Eden, of a larger size than those which seemed natural to the rock. These larger mussels were deemed likely to prove useful to the workmen, and might have been especially so to the light-keepers, the future inhabitants of the rock, to whom that mollusk would have afforded a fresh meal as well as a better bait than the limpet; but the mussels were soon observed to open and die in great numbers. The reason of this was not readily discernible, but at length it was ascertained that the whelk had greatly increased, and proved a successful enemy to the mussel. It was repeatedly observed to perforate a small hole in the shell, and then to suck out the finer parts of the body of the mussel; the valves of course opened, and the remainder of the mollusk was washed away by the sea. The perforated hole was generally —such is the instinct of these little creatures—in the thinnest part of the shell; it was perfectly circular, but widened toward the outer side, and so perfectly smooth and regular as to have all the appearance of the most beautiful work of an expert artist. Several subsequent attempts were made to plant mussels in this place, but they were all destroyed by the predaceous whelks.



THE COMMON WHELK.

Another British species of Whelk, the *B. lapillus*, produces a purple dye, similar to that obtained by the ancients. Mr. W. Cole of Bristol, in 1684, thus described the process adopted in England for obtaining this color: "The shells being harder than most of other kinds, are to be broken with a smart stroke with a hammer, on a plate of iron or firm piece of timber, with

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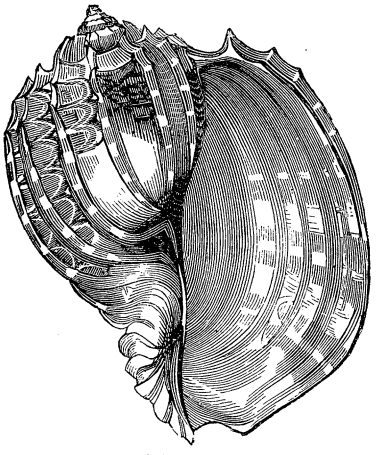
their mouths downward, so as not to crush the body of the fish within; the broken pieces being picked off, there will appear a white vein, lying transversely in a little furrow or cleft next to the head of the fish, which must be digged out with the stiff point of a horse-hair pencil, being made short and tapering. The letters, figures, or what else that shall be made on the linen and perhaps silk too, will presently appear of a pleasant light-green color, and if placed in the sun will change into the following colors, that is, if in winter about noon; if in the summer, an hour or two after sun-rising, and so much before setting; for in the best of the day in summer the colors will come on so fast that the succession of each will scarcely be distinguished. Next to the first light-green it will appear of a deep-green, and in a few minutes change into a sea-green; after which, in a few minutes more, it will alter into a watchet-blue; from that, in a little time more, it will be of a purplish-red; after which, lying an hour or two, supposing the sun still shining, it will be of a very deep purple-red, beyond which the sun can do no more. But then the last and most beautiful color, after washing in scalding water and soap, will, the matter being again put into the sun or wind to dry, be of a fair bright crimson, or near to the prince's color, which afterward, notwithstanding there is no use of any stiptic to bind the color, will continue the same, if well ordered, as I have found in handkerchiefs that have been washed more than forty times; only it will be somewhat allayed from what it was after the first washing."

The Red Whelk, *Fusus antiquus*, is of considerable size, and found on the coasts of the British Isles. Like many other shells, on being held to the ear, it produces a roaring sound, popularly supposed to be an echo from the sea.

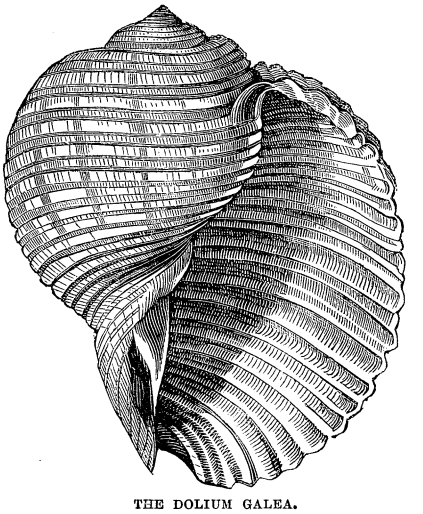
"The tinted sea-shell borne away,
Far from the ocean's pebbly shore,
Still loves to hum the choral lay,
The whispering mermaids taught of yore."

This species is hence called *Roaring Buckie* in Scotland; in the Shetland cottages it is used as a lamp. Other species are the Dog Whelk, *Nassa reticulata*; Augur-Shell, *Terebra maculata*, &c. Several small species of buccinum are found on our coasts.

The Purple, *Purpura Persica*, is also very destructive to mussel beds, and yields a dull purple dye. The *P. lapillus*, and some other species, are found on our shores.



THE HARP-SHELL.



THE DOLIUM GALEA.

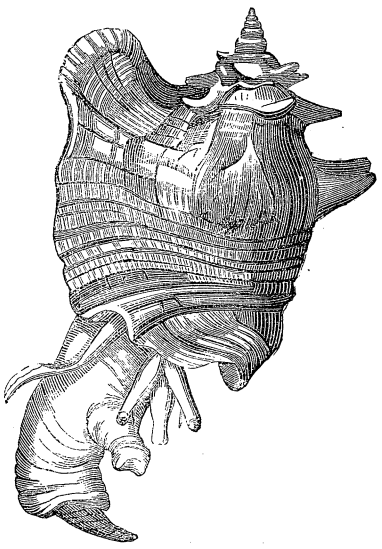
Genus HARPA: *Harpa*.—This includes the Harp Shell, *H. ventricosa*, abundant on the shores of the Mauritius and of the neighboring islands. For this and analogous species, there are fisheries in those regions, the animals being caught at night or near sun-rise, by nets attached to rakes.

Genus DOLIUM: *Dolium*.—This includes the *Dolium galea*, found in the Mediterranean, generally on reefs.

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THE STROMBIDÆ.

The animals of this family, called *Wing Shells*, have the outer lip of their shell much expanded; the foot is narrow and ill-adapted for creeping: the proboscis is large and thick, and the eyes large, supported on long, stout footstalks, from the sides of which the short tentacles rise. The species feed principally on carrion, and for molluscous animals they are very active. They progress by a sort of leaping movement, turning their heavy shell from side to side.



THE STROMB.

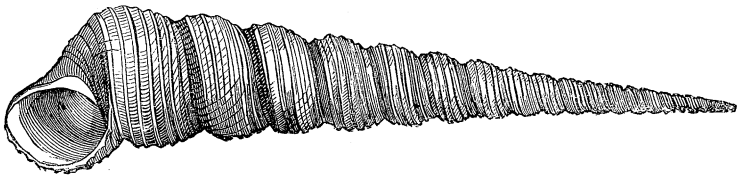
The STROMB, *Strombus pugilis*, is found in the West Indies, the Red Sea, India, Mauritius, and various other seas. The FOUNTAIN SHELL, *S. gigas*, found in the West Indies, is one of the largest of living shell-fish, sometimes weighing four or five pounds. As it becomes old, the apex and spires are filled with solid shell. Immense quantities are annually exported from the Bahamas for the manufacture of cameos and for porcelain works. In 1850, three hundred thousand were brought to Liverpool alone.

The CONCH SHELLS, formerly much used in this country by farmers to call their workmen to their meals, are of this genus.

The SCORPION SHELL, *Pteroceras lambis*—found in India and China—is of this family. Ten living and a hundred fossil species are known.

THE TURRITELLIDÆ.

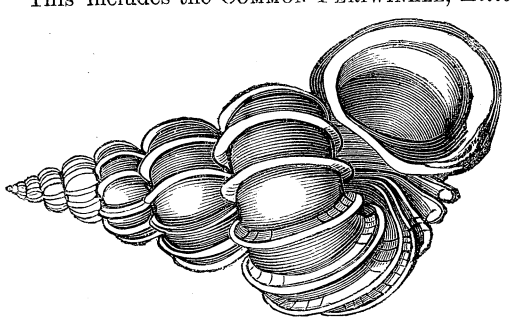
In these, which may be called *Tower Shells*, and which derive their name from the Latin, *turris*, a tower, the shell exhibits a great variety of form, sometimes being semi-globular and sometimes elongated, and tapering gradually to the apex. The *Turritella rosea* has the shell elongate, conical, smooth, and of a rosy color: found in New Zealand. The *T. terebra*, is found in the African and Indian seas. There are fifty living and one hundred and seventy fossil species of this family.



THE TURRITELLA TEREBRA.

THE LITTORINIDÆ.

This includes the COMMON PERIWINKLE, *Littorina littorea*, found on the sea-shore in all parts of the world. It is oviparous, and inhabits the lowest zones of sea-weed between tide-marks. The *L. rudis* frequents a higher region, where it is scarcely reached by the tide. The periwinkles are exceedingly small, but their tongue is two inches long. Immense numbers of them are devoured by birds of various kinds. Nearly allied to the periwinkle, are the STAIR-CASE SHELL, of the genus *Solarium*, the CARRIER SHELL, of the genus *Phorus*, and the LOOPING SNAIL, of the genus *Truncatella*.

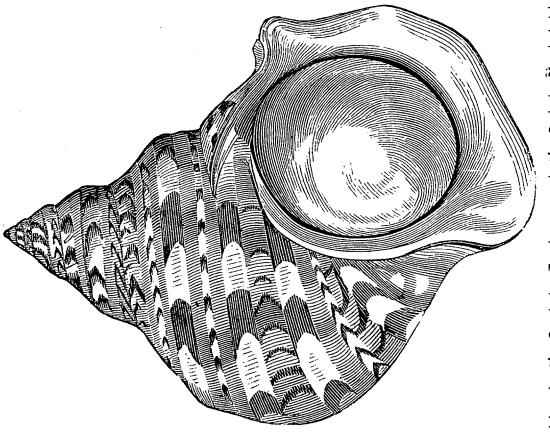


THE WENTLE-TRAP.

To this tribe belongs the genus *Scalaria*, popularly called *Wentle-Traps*; the shell is mostly white and lustrous, turreted and many-whorled;

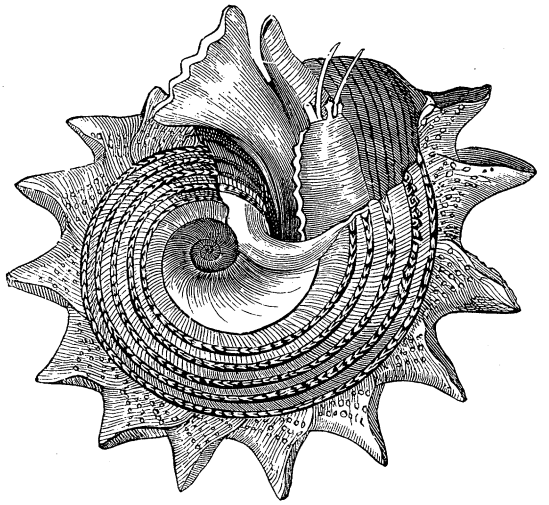
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the animal has a proboscis-like mouth, tentacles close together, long, and pointed, and the eyes near their outer bases. There are nearly one hundred species, mostly tropical, but some are found in the Mediterranean, in various parts of the Atlantic and Pacific. On our coast six or eight species are found; among them the *S. subulata*, an inch long, of a bluish-white, varying to livid brown.



THE TOP SHELL.

Some of the Wentle-Trap shells are of great value. The ROYAL STAIR-CASE WENTLE-TRAP, *S. pretiosa*, found in the China and Indian seas, formerly sold for four hundred dollars; a fine specimen is even now worth twenty to thirty dollars. On account of its value, Lamarck gave this species the specific name of *pretiosa*, that is, valuable or precious.

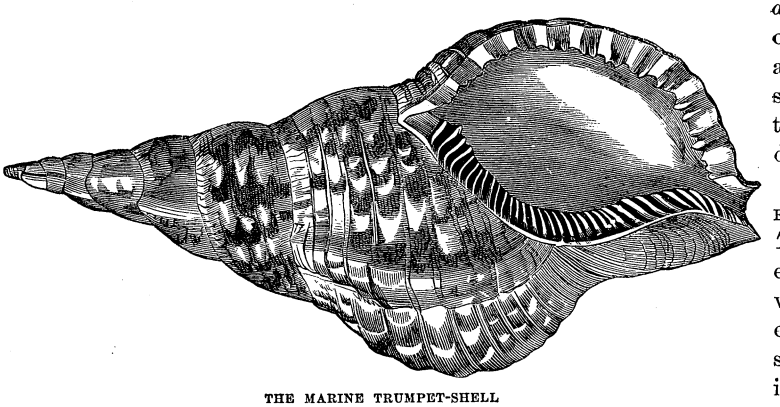


THE TROCHUS IMPERIALIS.

THE TURBINIDÆ.

In this family, the name of which is derived from the Latin *turbo*, a whipping-top, in allusion to the shape of the species, the shell is more or less conical or pyramidal; the animal has a short muzzle; the tentacles are long and slender, with the eyes supported on short footstalks near their bases. The interior of the shells are generally pearly. These animals are all marine, feed on vegetable substances, and are very widely distributed.

Genus TURBO: *Turbo.*—Of this there are sixty living and three hundred and sixty fossil species. The TOP-SHELL, *T. marmoratus*, has a turbinated solid shell, with convex whorls. Found in tropical seas. Other species are the PHEASANT-SHELL OF AUSTRALIA, *Phasianella Australis;* the NILE HOOP-SHELL, *Trochus Niloticus;* and the *T. imperialis.* The latter is found only at New Zealand, and here it is rare; the shell is very beautiful, the whorls rising in a depressed cone.



THE MARINE TRUMPET-SHELL

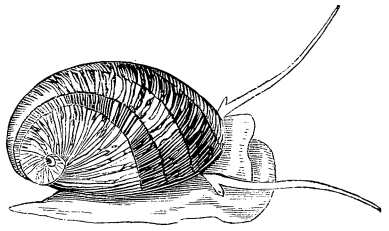
The MARINE TRUMPET OR TRITON'S SHELL, *Triton variegatus*, is elegantly variegated with red and bay, the edge of the outer lip spotted with black. It is a native of the Asiatic West Indian seas.

The GREAT TRITON, *T. Tritonis*, is the conch blown by the Australian and Polynesian Islanders. The genus *Triton* is placed with the family *Muricidæ* by some authors.

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THE NERITIDÆ.

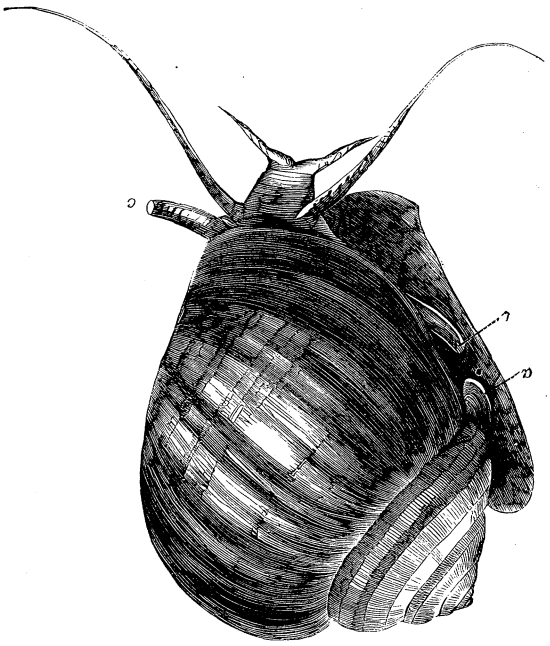
This is a small family, the typical species of which, *Nerites ustulata*, are called *Sea-Snails:* they have a thick and rather globose shell, and are mostly marine; those of the genus *Neritina*, however, inhabit fresh water. The POLISHED NERITA, *Nerita polita*, is distributed through nearly all tropical seas.



THE POLISHED NERITA.

THE PALUDINIDÆ.

This family includes several genera, having somewhat globular shells, with a thick olive-green epidermis. The RIVER-SNAIL, *Paludina Listeri*, has a turbinated shell, with round whorls. Found in the Caspian and Black Seas. The APPLE-SNAIL or IDOL-SHELL, *Ampullaria globosa*, has a globular shell and a large ventricose body-whorl; found in the West Indies, South America, &c. The *A. dubia* is found in the Nile. Several species of this genus, brought from Egypt to Paris packed in bran, were found living, though they had been four months in making the passage.



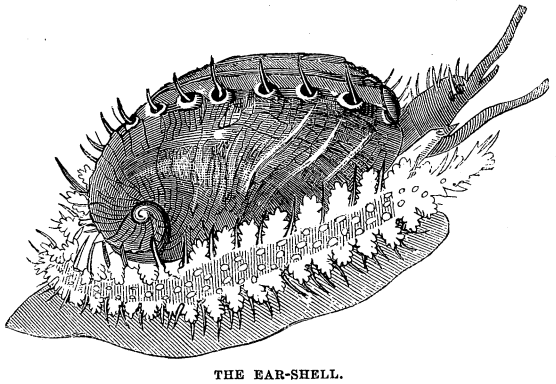
THE AMPULLARIA DUBIA.

THE NATICIDÆ.

In these the shell, which is globular, composed of five whorls, and has an entire aperture, is partially inclosed in the mantle. The *Natica canrena*, found in various seas, is blind; it frequents sandy and gravelly bottoms, ranging from low water to a depth of ninety fathoms.

THE IANTHINIDÆ.

These are carnivorous and oceanic, and possess shells almost exactly resembling those of the land-snail; they are without eyes, and secrete a sort of operculum, which operates as a float, bearing them about upon the water. They occur in vast numbers in the Atlantic, and are sometimes driven by storms upon the coasts of Great Britain; the same happens on our shores. In 1839, great numbers of them were washed upon the beaches of Nantucket.



THE EAR-SHELL.

THE CALYPTRÆIDÆ.

These, called *Bonnet Limpets*, have a limpet-like shell, which is usually somewhat spiral at the apex; they appear to pass a sedentary life, attached to stones and rocks. Of the widely distributed genus *Calyptræa*, of which the CUP-AND-SAUCER LIMPET, *C. equestris*, is the type, fifty species are known.

THE HALIOTIDÆ.

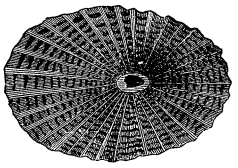
In these, which are called *Ear-Shells*, the animal has a short muzzle and two branchial plumes; the shell has a spiral conformation, and the perforations for the anal siphon are arranged in a row along the back of the shell. The TUBER-

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CULATED SEA-EAR, *Haliotis tuberculata*, grows to a large size in intertropical seas; it is also common on the coasts of the islands of Jersey and Guernsey, where it is used for food, being esteemed very palatable. It is well beaten to make it tender, before being cooked. The shell is much used for inlaying, and other ornamental purposes.

THE FISSURELLIDÆ.

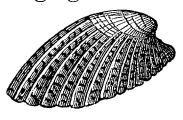
These are nearly related to the preceding; the shell resembles that of the limpet. The species are numerous and widely distributed. They inhabit rocky beds and reefs at various depths. The GREEK FISSURELLA, *F. Græca*, is found in the Mediterranean and the Indian Ocean. There are one hundred and twenty other known species of this genus.



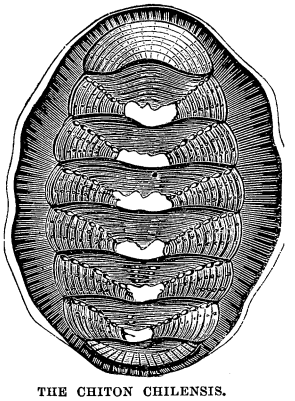
THE GREEK FISSURELLA.

THE PATELLIDÆ.

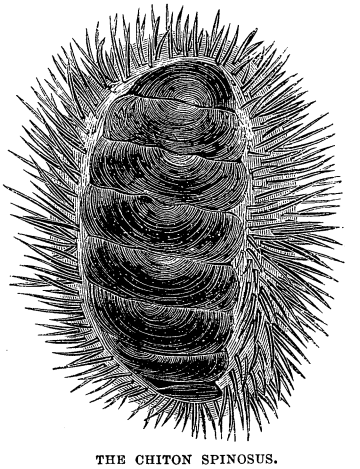
This includes the *Limpets*, which have a conical shell, the interior of which is entirely occupied by the animal. They are spread over every latitude, except in the Arctic regions. Millions are taken every year in Great Britain for fish-bait, and immense numbers on the coasts of Ireland for food. They are found principally on rocky coasts, attached to stones and shells, at a depth ranging from the surface of the water to thirty fathoms. They feed on sea-weed, in the mastication of which their rasp-like tongues are very efficient. They attach themselves so firmly to rocks and shells, by creating a vacuum on the under surface, that they can be detached with difficulty. It is even said that they have the power of dissolving and absorbing the substance to which they are affixed, so as often to create a deep excavation beneath them. There are many species, varying in form and size, the largest being found on tropical shores. The *Patella pectonata* is found in the Mediterranean. A very small species, the *P. candida*, is found in our waters. On the western coast of South America, there is a species a foot in diameter, and the shell is used by the inhabitants for a basin. Forbes tells us that each limpet has nineteen hundred and twenty teeth.



PATELLA PECTONATA.



THE CHITON CHILENSIS.



THE CHITON SPINOSUS.

THE CHITONIDÆ.

In the *Chitons* the shell is composed of eight calcareous plates, overlapping one another at the edges, and united by a strong leathery mantle, which forms a border all round the shell. In some species the mantle is fringed with hair, and in others with bristles or spines. The kinds are numerous, and are found on nearly all rocky shores, adhering to stones and other submarine bodies, like the limpets; a few have the habit of creeping in the sand. More than two hundred species are known. The *Chiton Chilensis* has a smooth border; it is found in crevices of rocks and under stones, near Valparaiso. The *Chiton spinosus* is bordered by long, black, aculeated spines; found in the South Seas; length three inches. Several small species are common on our coasts.

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THE DENTALIIDÆ.

These, which have been called *Tooth-Shells* and *Shell-Worms*, have a tube-shaped shell, tapering from one end to the other, and slightly curved throughout, so as to appear like a minute elephant's tusk; hence the common species, *Dentalium elephantinum*, is popularly called *Elephant's Tooth*. It has an aperture at each end; the animal inhabiting it is of a cylindrical form, and inclosed in a sac-like mantle. Thirty living and seventy fossil species are known. They are of various sizes, and are found on nearly all shores.



THE ELEPHANT'S TOOTH.

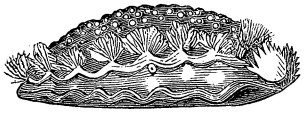
THE OPISTHOBRANCHIATA.

This term is from the Greek *opisthos*, behind, and *branchiæ*, gills. In the animals which compose the group, the branchiæ are not generally inclosed within a cavity of the mantle, but are more or less exposed on the back or sides of the animal, generally toward the posterior portion; and the auricle of the heart, which receives the blood from the gills, is placed behind the ventricle. All the species are hermaphrodites; few of them are inclosed in a shell; some have an internal shell, but the majority are naked. The three following families are called *Nudibranchiata*, the others *Tectibranchiata*.

THE DORIDÆ.

In these animals, called *Sea-Lemons*, the body is shelless and oblong; the gills plume-like, and placed in a circle on the middle of the back; the tentacles two; the eye-specks immersed behind the tentacles, and not always visible in the adult. They are delicate little creatures, adorned with pleasing colors, and are generally found along the sea-coasts, crawling upon sea-weed. They vary in size from one quarter of an inch to three inches, are carnivorous, and feed on zoophytes and sponges; found on rocky coasts in nearly all parts of the world.

THE TRITONIIDÆ.

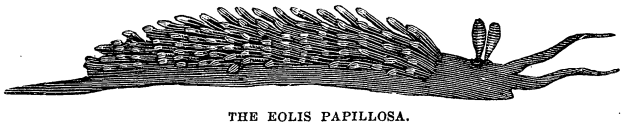


TRITONIA HOMBERGII.

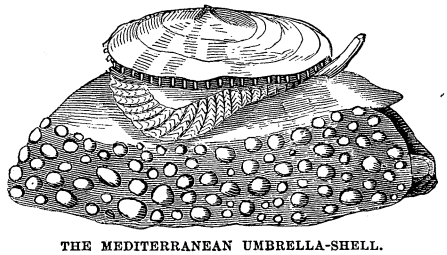
The *Tritonias* are naked, like the preceding, with plumose or papillose gills; the body is elongated, sometimes six inches long; some are found under stones at low water, and some floating on sea-weed. The *T. Hombergii* attains a length of six inches. There are several analogous genera.

THE ÆOLIDIDÆ.

In these animals, which generally appear like small slugs, the branchiæ are arranged along on each side of the back; the tentacles are not retractile; some species have a very singular appearance, the body being slender, and the gill-tufts supported at the extremities of lateral footstalks.



THE EOLIS PAPILLOSA.



THE MEDITERRANEAN UMBRELLA-SHELL.

THE PLEUROBRANCHIDÆ.

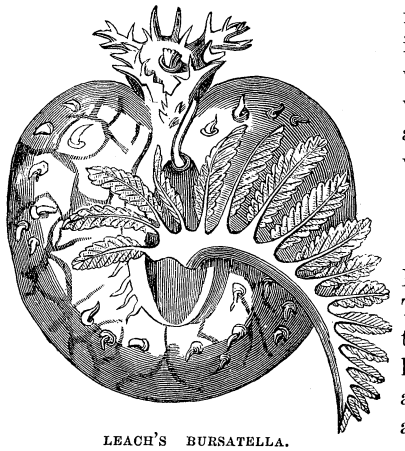
These animals, called *Umbrella-Shells*, are furnished with a shell, which, however, is often concealed by the mantle; the foot is usually large, and the feather-like gill hidden between a fold of the mantle and the foot. The shell is sometimes limpet-shaped. The *Umbrella Mediterranea* and the *U. Indica* are the only known species. They are found on rocky coasts, at various depths from the surface to thirty fathoms.

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THE APLYSIADÆ.

These animals, called *Sea-Hares*, are slug-like in form, the head distinct and furnished with tentacles and eyes; the shell is absent or rudimentary. They are found among sea-weed, from which they derive a great part of their subsistence; they feed also on animal substances. When alarmed or molested, they emit a violet or reddish fluid from the mantles, long supposed to be poisonous, but now known to be harmless. Forty species are found in the Atlantic, Mediterranean, Indian, and Chinese seas.

The *Aplysia depilans* of Linnæus, the type of this genus, early attracted the attention of naturalists; its singular resemblance of form to a crouching hare, was observed by the ancient Greeks and Romans, who bestowed upon it the title it still bears. By them it was regarded with no little superstition, and its haunts along the coasts, supposed to be inhabited by the Nereids, were shunned by the fishermen.



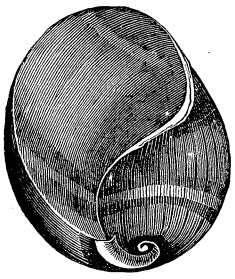
LEACH'S BURSATELLA.

THE BURSATELLIDÆ.

We may place here an animal of which little is known, LEACH'S BURSATELLA, *B. Leachii*, found in the Indian seas. The descriptions given of it are very obscure; it appears to be destitute of shell, the body globular, the lower part having an oval space, circumscribed by thick lips; the animal is furnished with curious swimming and branchial appendages. Its place is not very definitely settled by naturalists. Rang arranges it with the Aplysiadæ.

THE BULLIDÆ.

These, which are called *Bubble-Shells*, have a delicate globular shell, more or less inclosed in the mantle. The foot is large and often furnished with lateral lobes, used in swimming; the gill is single, placed on the right side of the back and concealed by the shell. They are carnivorous, and found generally on the Atlantic shores. The *Bulla ampulla* is beautifully mottled with white, plum-color, and reddish. The *B. velum* is very elegant, and of a light-brown color; the apex and base are both white, bordered with dark-brown bands. The preceding species are found in the European and Indian seas. The *B. lignaria*, noted for having a testaceous gizzard, appears to be common on the British shores. There are several species on our coasts, but all are small, mostly about one-third of an inch long. Among them is the *B. triticea;* the *B. debilis*, an exceedingly minute species; the *B. hiemalis*, found in the stomach of codfish; and the *B. oryza*, found south of Cape Cod.



THE BULLA VELUM.

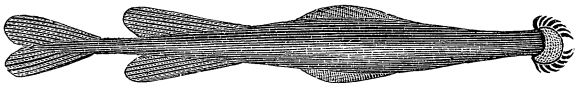
ORDER 3. **HETEROPODA.**

The animals of this order, the *Nucleobranchiata* of some authors, are all inhabitants of the ocean, where they swim about rapidly, the whole structure of their bodies being adapted particularly to this mode of existence. The foot, when present, is converted into a broad, flattened, fin-like organ, furnished with a small sucker, by which the animals adhere to floating sea-weed. The whole body is usually compressed; and it is by the fin-like action of the tail that the creatures swim. The head is distinct, and usually furnished with a pair of tentacles and eyes; the mouth is generally provided with a long proboscis. The animals are usually of a transparent gelatinous texture; they swim with the back downward, and appear to feed upon minute marine animals.

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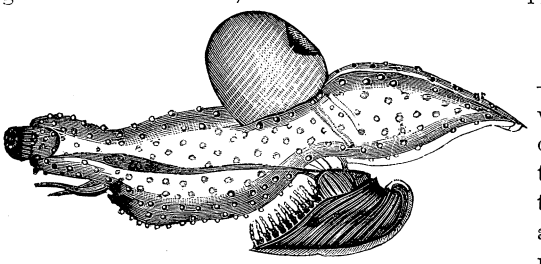
THE SAGITTIDÆ.

These are little fish-like animals furnished with one or two fin-like organs on the body and a broad and usually bilobed caudal-fin. They are of small size and swim with great rapidity. They have hitherto been found principally in the North Sea and in the Mediterranean. The name of *Sagitta*, given to these animals, refers to their arrow-like appearance.



THE SAGITTA.

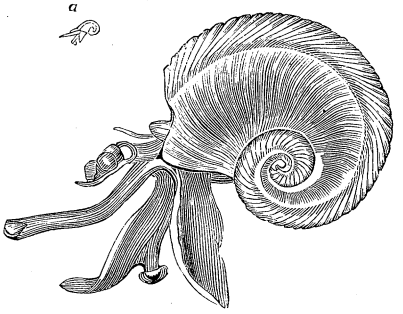
THE FIROLIDÆ.



THE CARINARIA, SWIMMING WITH BACK AND SHELL DOWNWARD.

These are either entirely naked or furnished —as is the case with the *Carinaria cymbium*, of which an engraving is annexed—with a small, conical, keeled shell, which incloses the intestinal nucleus. The Carinaria has an elongated transparent body, dotted with elevated points, and furnished toward the upper part of the posterior extremity with a sort of fin, which performs the office of rudder; nearly opposite to this, on the belly, is a semicircular fin; with the aid of this it floats in the water. The shells of this genus were formerly known under the head of *Venus' Slipper* and the *Glass Nautilus*. The *C. Mediterranea* is abundant in the vicinity of Nice. A few other species are found in warm climates.

THE ATLANTIDÆ.



THE ATLANTA PERONII.

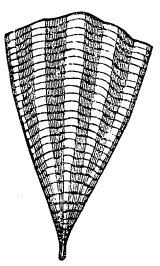
In these the shell is spiral, and so large as to contain the whole animal when it is contracted. These were formerly supposed by some naturalists to be the original of the fossil ammonites, or at least an analogous family. In the *Atlanta Peronii*, found in the vicinity of the Canary Isles, the shell is minute, glassy, and compressed. In the annexed engraving, the figure *a* shows the actual size.

Class III. PTEROPODA.

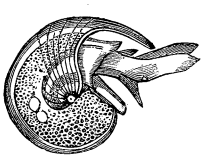
This term is derived from the Greek *pteron*, wing, and *pous*, foot, and is descriptive of these little animals, which are furnished with a pair of broad, flattened fins at the sides of the head, by means of which they are able to swim with tolerable rapidity, through the open sea, which is their favorite abode. They seldom approach the shores unless driven thither by the winds. They often crowd the sea in such inconceivable numbers as to color the surface for many miles. There are two orders of pteropoda characterized by the presence or absence of a shell.

ORDER 1. THECOSOMATA.

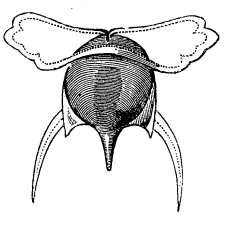
The animals of this order are always inclosed in a shell, usually very delicate and of a glassy transparency. There are several genera, of forms differing greatly from each other. The shell of the *Cleodora pyramidata* is triangular; that of the *Limacina rostralis* resembles a small nautilus in form. The *Hyalea tridentata* is globular and transparent, with long appendages to the mantle. This is common in the Atlantic, Mediterranean, Indian Ocean, &c.



CLEODORA PYRAMIDATA.



LIMACINA ROSTRALIS.

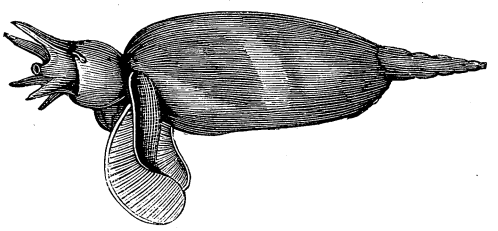


HYALEA TRIDENTATA.

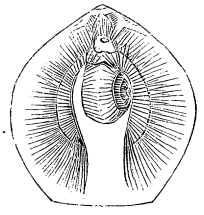
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ORDER 2. GYMNOSOMATA.

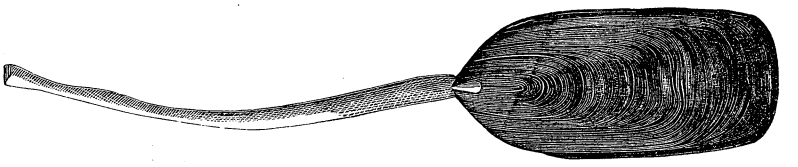
The animals of this order are distinguished by the absence of a shell, and the distinct separation of the head from the body. The species of the genus *Clio*, belonging to this order, exist in prodigious numbers in the Arctic and Antarctic seas. So great, in fact, is their abundance, that although they do not exceed an inch in length, they furnish a great part of the food of the whale-bone whales. They are usually of a beautiful blue or violet color, tinged with red. In calm weather they come in myriads to the surface to breathe, but soon precipitate themselves toward the bottom. Cuvier says that portions of the Arctic seas are so glutted with these creatures that a whale cannot open his mouth without ingulfing thousands of them. The most common species are the *C. Australis* and *C. Borealis*. There is a larger species in the Indian Ocean of a rose color.



THE CLIO BOREALIS.



THE LAMP-SHELL.



THE LINGULA ANATINA.

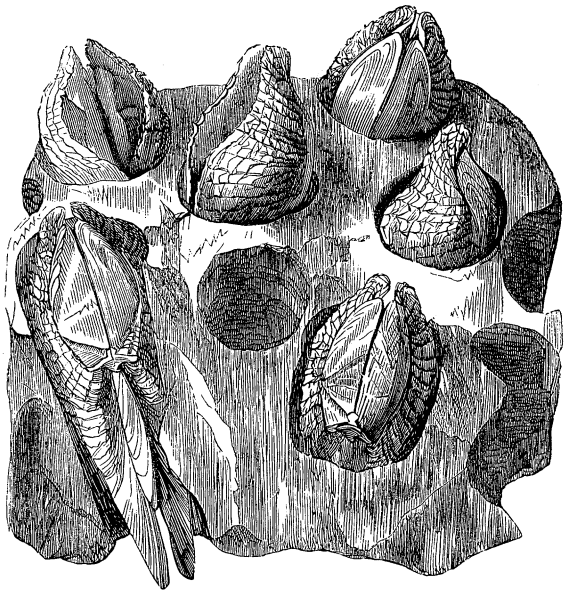
Class IV. PALLIOBRANCHIATA.

This term is derived from the Latin *pallium*, a cloak, and *branchiæ*, gills, and refers to the fact that in these animals the respiratory function is performed by the mouth, there being no special branchial apparatus. They possess shells which are of peculiar structure, consisting of flattened prismatic cells. They are always marine, and are found attached by the peduncle to rocks, corals, and other submarine objects. The Lamp-Shell, *Terebratula maxillata*, has a smooth convex shell, the animal attached by a peduncle. The *Lingula anatina* has a long peduncle issuing from between the umbones. The valves are nearly equal, horny, and flexible. It is found in the Indian Ocean.

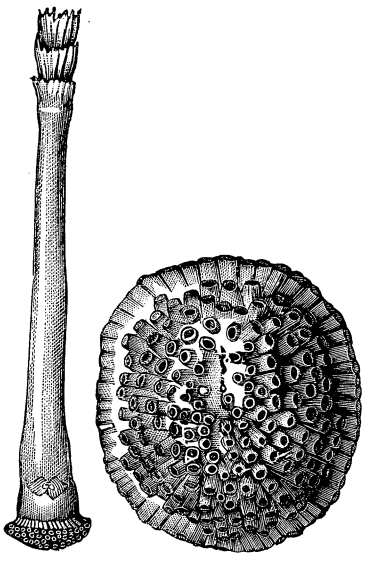
Class V. LAMELLIBRANCHIATA.

This term is derived from the Latin *lamella*, a thin plate, and *branchiæ*, gills, and is used to characterize the ordinary bivalve mollusca, which are usually inclosed in a bilobed mantle; in all cases the two sides of the mantle produce a calcareous shell consisting of two valves. These animals are divided into two orders, the *Siphonata* and the *Asiphonata*.

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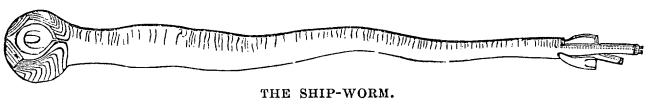
A BLOCK OF STONE PERFORATED BY THE PHOLAS DACTYLUS.



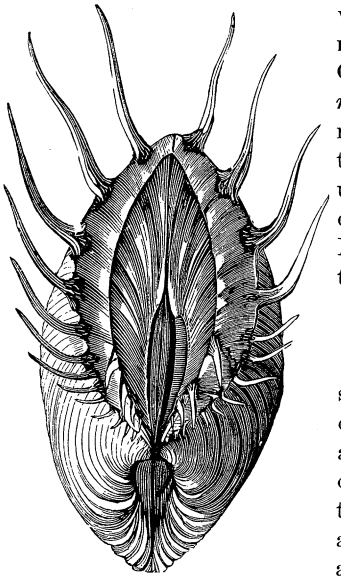
a TUBE OF THE WATERING-POT SHELL. b PERFORATED END OF TUBE MAGNIFIED.

ORDER 1. SIPHONATA.

This term is derived from the Greek *siphon*, a curved tube. It includes several remarkable species. Among them is the WATERING-POT SHELL, *Aspergillum vaginiferum:* the animal in this case is inclosed in a calcareous tube, the anterior extremity of which is closed by a curious perforated disk; the other end is ornamented with several ruffle-like bands. To this family belong the *Pholadidæ*, the species of which are noted for boring into hard substances, some of them making their burrows in limestone rocks, and others in wood. One of the most celebrated species is the SHIP-WORM, *Teredo navalis*, a small, worm-like animal, which bores into wood submerged in sea-water, and often does great damage to ships, and to piles used for wharves and breakwaters. They bore perpendicularly, and often in great numbers, but they never encroach upon each other. When stretched out they are one to two feet long. Metal sheathing and broad-headed iron nails have been found to be the best defense against these destructive pests.



THE SHIP-WORM.



THE CYTHEREA DIONE.

THE VENERACEA.

These constitute a tribe of bivalve mollusks with elongated siphons, and include many very elegant shells; they generally conceal themselves by burrowing, sometimes in the sand and mud, and sometimes in the solid rock. The principal agent in these operations is the foot. One of the most remarkable species is the *Cytherea dione*, the posterior border being beset by spines, and the sides furrowed with elevated lamellæ. The color is of a beautiful rosy purple. Found in South American seas. The *C. convexa* is a small species, one inch and a half long, found on muddy bottoms along our coasts from New Jersey to Mexico, and is called *He-Clam* by the fishermen.

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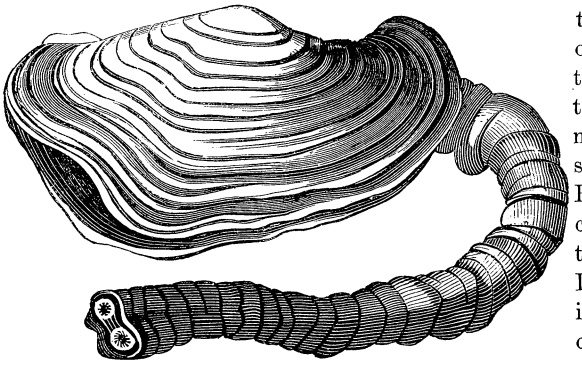
The Round Clam, *Venus mercenaria* of De Kay—the *Quahog* of the Indians—is two to three and a half inches long, and is greatly esteemed as food. It is found from Delaware Bay to Cape Ann, and is consumed in large quantities. From the internal purple part of the shell, the colored beads of the Aborigines were formerly manufactured, constituting the *wampum* which was used as their specie currency. Long Island was anciently the great mint for the supply of this article, hence its Mohican name of *Seawan Hackee*, or the Isle of Shells. The *V. notata* resembles the preceding, and is often found mingled with it: by some it is regarded as of the same species. It is, however, smaller, and is probably distinct. There are many other species of the genus *Venus* along the coasts of the United States.

THE MACTRIDÆ.

To this family belongs the Beach-Clam or Dipper-Clam of Long Island, *Mactra solidissima*, the largest of our bivalve shells, measuring sometimes seven inches across. It is found buried in the sand, and is relished as food. There are several other species, and also several other analogous genera, on the Atlantic shores of the United States.

THE MYADÆ.

To this family belongs the Long Clam, *Mya arenaria*, found on both sides of the Northern Atlantic shores; it is abundant on the coasts of New England and New York, and greatly esteemed by the inhabitants for food. In some places it retains its Indian name of *Maninose*. The shape of the shell is oval, the siphon protruding, sometimes half an inch, from one end. It is found buried a few inches deep in the sand between high and low water mark. It is usually detected by a small aperture in the sand, from which it ejects a stream of water if any one treads near it. On parts of Long Island the hogs root for this species, following the ebb and flow of the tide. Five thousand bushels of these clams are annually consumed in Boston; five thousand barrels, containing five millions of clams, are annually taken and salted on the coasts of Barnstable and Essex, in Massachusetts, for bait for the cod-fisheries. This species is very extensively used along the shores of Rhode Island* and Connecticut. In point of real importance it yields to no shell-fish in our country except the oyster.



THE PANOPÆA AUSTRALIS.

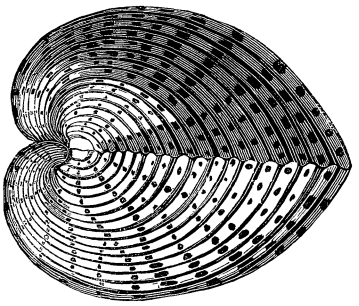
There are several other species of this genus: the *Panopœa Australis* is a large analogous species, found at Port Natal, on the coast of Africa. It buries itself several feet deep in the sand. In general form it resembles the long clam, but its siphon projects farther from the shell.

* The *Clam-bakes*, which take place every season, near Bristol, Rhode Island, and often in other parts of that state, as well as in Massachusetts, are said to be founded on traditions of the Indians in that quarter, who were accustomed to hold clam-feasts, in which great numbers were assembled, and a high festival was had over Long Clams and Green Corn, roasted in heaps, and arranged in layers between sea-weed. The modern Clam-bake is a refinement upon that of the Aborigines. A circular layer of large stones, some ten feet in diameter, is arranged on the ground: over this is made a strong fire till the stones are nearly red-hot. Over the stones is placed a layer of sea-weed, and on this a layer of clams two or three inches thick. Then comes another covering of sea-weed, and then green corn in the husk, with potatoes and other vegetables; then a layer of chickens dressed and seasoned; then a coat of sea-weed; then tautog, pan-fish, lobsters, and the like. These layers are repeated according to the extent of the party. The pile being finished, the whole is covered with a tent-sheet to keep the steam in. When done, each member of the party helps himself in a free-and-easy way. The feast is said to be luxurious beyond description, and it is affirmed that no one was ever known to suffer from a surfeit at a Clam-bake. In the ancient days of the savages, renowned warriors assembled here, from far and near, to partake of these feasts. In like manner, the braves of the bench, the bar, and the forum, of our days, gather at the bakes, attended by fair ladies—these assemblies sometimes amounting to hundreds of individuals.

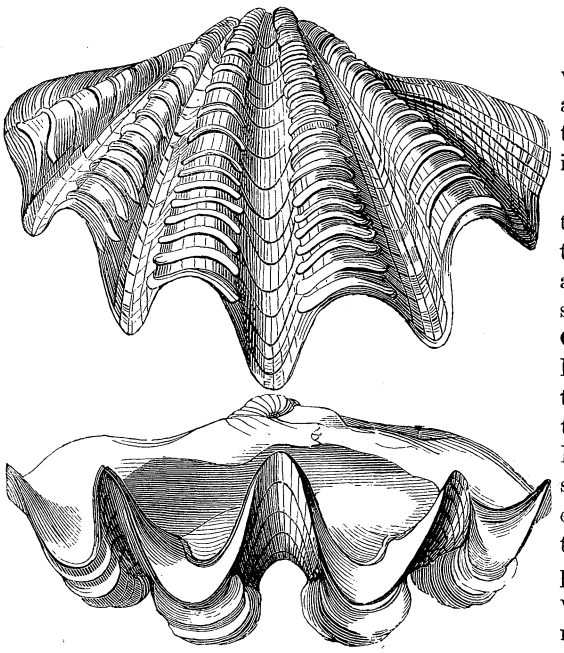
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THE CARDIACEA.

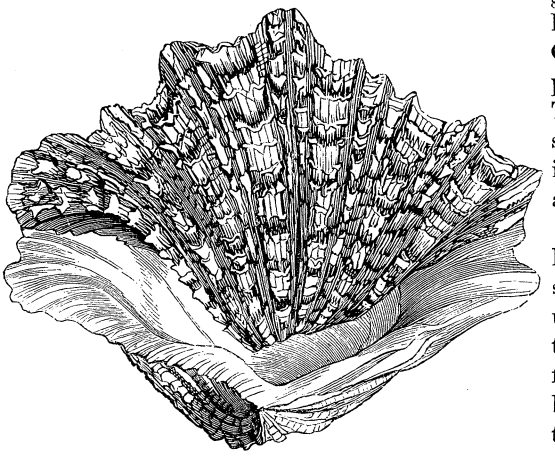
These include a great variety of species—two hundred in number—bearing the general name of *Cockle*. Many of them are elegantly marked with radiating ribs, and these are sometimes ornamented with spines of various forms. They are usually active animals, often springing to a considerable height by means of the strong bent feet. They generally live concealed in the mud. The COMMON COCKLE, *Cardium edule*, is eaten in large quantities on the coasts of Europe. The *C. Junonæ* is a very beautiful species. The great assemblage of the different kinds is in the Indian Ocean, though some of the species are found in all seas. Several small species, as the *C. Greenlandicum*, the *C. Martinii*, &c., are found on our coasts.



THE CARDIUM JUNONÆ.



SHELLS OF THE GIANT CLAM.



THE HIPPOPUS MACULATUS.

THE CHAMACEA.

This group includes several genera of bivalved mollusca, sometimes called *Clams*, and mostly found in tropical countries; certain species are the largest animals belonging to this division of the animal kingdom.

Of the genus *Chama*, there are more than twenty species, generally found attached to submarine substances as rocks and corals; they are of various forms and sizes, though generally large. The GIANT CLAM, *Tridacna gigas*, is the largest of known shell-fish, the two valves sometimes weighing five hundred pounds, and the animal from twenty to thirty pounds. It is found along the shores of the Polynesian and Asiatic Islands, where the flesh is eaten raw by the natives. The interior of the shell is beautiful, being white and like polished marble; the form is also elegant, whence it is much sought for as an ornament for fountains, grottoes, and flower-gardens. It is also employed as fonts for holy water in Catholic churches in Europe. One of enormous dimensions is used for this purpose in the church of St. Sulpice, Paris. The shells of the *Hippopus maculatus* are smaller but are very beautiful, and are used in the manufacture of various ornamental articles, as inkstands, &c.

Broderip says of the chamacea, that they have been found at various depths, from the surface to seventeen fathoms; their shape is usually determined by the body to which they are fixed; their color seems to be influenced by their exposure to the light. The byssus by which the *T. gigas* is attached to the rocks is so firm and tough, that it can only be severed by an ax.

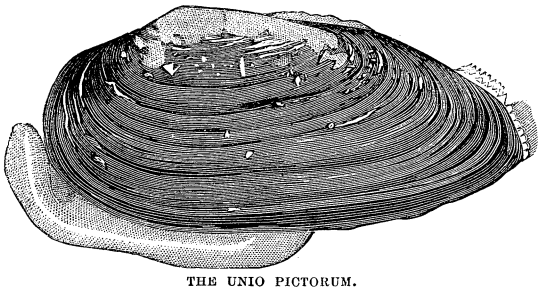
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ORDER 2. **ASIPHONATA.**

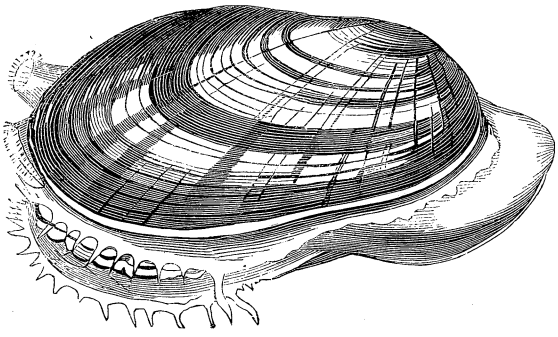
This term, derived from the Greek, signifies *without tube*, and includes some of the most important of molluscous animals. In general, the shells are more or less orbicular, and the valves often unequal. The animal reposes on and adheres by the more convex of its valves. The mantle is open throughout; the foot is sometimes absent; when present it is small and usually furnished with a byssus; there is only a single adductor muscle. The order includes several families.

THE UNIONACEA.

This family includes numerous species, two hundred of which belong to the United States, where they are called *Fresh-Water Clams* and *Mussels*. They are, in fact, all inhabitants of fresh-water, and few of our lakes, ponds, or rivers are without some of the species. From the observations of Dr. Kirtland and others, it appears that they are bisexual. They have an equivalve shell, covered with a smooth epidermis, and lined with pearly matter. Several of the species furnish pearls of an inferior quality. The *Unio pictorum* is common in Europe, and derived its name from the fact that its shell was formerly used by painters to hold their colors. The *U. elongata* is found in Great Britain, and formerly produced numerous pearls; these were famous even in the time of Julius Cæsar. In Ireland and Scotland this species has produced pearls, in modern times, valued at from twenty to four hundred dollars.

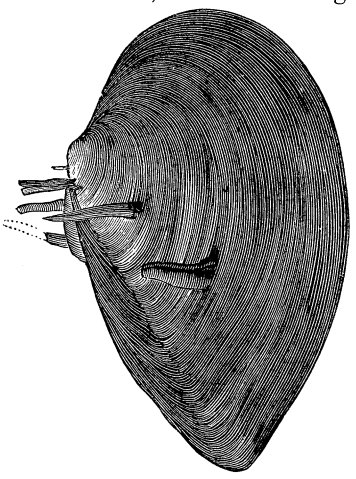


THE UNIO PICTORUM.



THE UNIO ELONGATA.

The *U. Novi-eboraci*, found in the State of New York, resembles the *U. pictorum*. The *U. cariosa*, found in the Hudson and Passaic Rivers, is one of the largest and most beautiful species. The *U. spinosa* is found in the Mississippi River. The *U. radiata* is common in the Middle States. Dr. Lea, of Philadelphia, who, as well as Dr. Kirtland, has largely contributed to our knowledge of subjects connected with the natural history of the United States, has furnished some extremely curious facts in relation to the *Anodonta undulata*, belonging to this family. This species, which is three inches long, he found to be hermaphrodite and viviparous; on dissection, he discovered the oviducts to contain six hundred thousand young animals, with their shells perfectly formed, both valves being distinctly visible by the microscope!



THE UNIO SPINOSA.

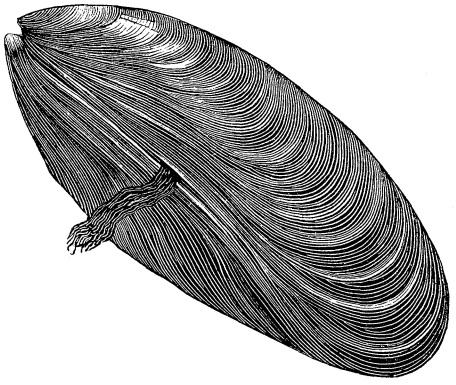
Pearls have been occasionally found in the mussels of the rivers of Connecticut, New York, and New Jersey. In a small stream of the latter state, called *Notch Brook*, near the town of Patterson, a shoemaker by the name of Howell, found a few years since a pearl of enormous size in a mussel, but, unfortunately, not till after it had been cooked, by which means it was ruined. About this time, that is, in 1857, a carpenter of Patterson, named Quackenbush,

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having heard of Howell's good and bad fortune, became a pearl-hunter, and, after wading about in the mud of Notch Brook for many days, found a mussel from which he extracted a splendid pearl, five-eighths of an inch in diameter. It was of perfect form and pure colors, and was sold to Messrs. Tiffany & Co., of New York, for a thousand dollars. This was sent to Paris, and re-sold for twenty-two hundred dollars. These incidents produced a general pearl-hunt all over the country, and a number of small pearls were found; but the search was, on the whole, unsuccessful, and it is now abandoned.

THE MYTILACEA.

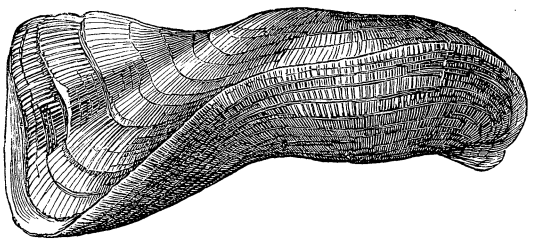
This includes several genera of what are properly called *Mussels;* these live mostly, if not entirely, in salt water; the fish has a byssus by which the animal usually attaches itself to some rock on the shore. The valves are generally equal, of an elongated form, and pearly inside. Many of the species conceal themselves by burrowing into various substances; some can penetrate rocks, corals, and shells for this purpose. Some species make use of the byssus to spin themselves a sort of net. Though inferior to the oyster, immense quantities of the Common Mussel, *Mytilus edulis*, are eaten in Europe: four hundred thousand are said to be annually consumed in Edinburgh and Leith, and thirty or forty millions to be used for bait in the Frith of Forth. Several species of this genus occur on our American coasts.



THE COMMON MUSSEL.

THE ARCACEA.

In these the shells are nearly equal, usually thick and furnished with a long row of teeth at the hinge. Among them is the *Arca tortuosa*, the shell somewhat twisted and striated; found in the Indian Ocean. The *A. pexata*, common on our coasts, is called the *Bloody Clam*, because, on being opened, there issues from it a flow of reddish liquid. There are other American species. The *A. transversa* is common from Cape Cod to the coasts of New Jersey.



THE ARCA TORTUOSA.

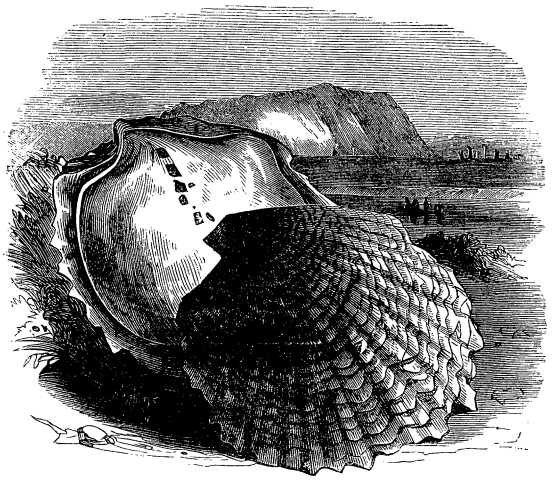
THE AVICULACEA.

In this tribe, which is rendered important by its including the *Pearl-Oyster*, the foot is small, and produces a byssus by which the animal attaches itself firmly to submarine objects. The mantle lobes are free; the shell usually oblique and somewhat triangular, with the valves unequal, and the hinges without teeth.

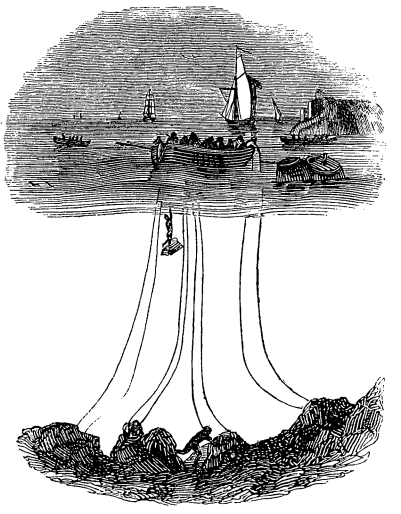
Most of the shells are pearly in the interior; and as the true pearls are merely morbid growths, they may all produce pearls of various qualities. The formation of pearls is caused by the introduction of irritating substances, such as grains of sand, between the mantle and the shell. The irritation causes the animal to cover the obnoxious object with layers of pearl, which generally attach the foreign body to the interior of the shell. The Chinese produce pearls artificially by placing substances in the position thus described.

The Pearl-Oyster, *Meleagrina margaritifera*, furnishes the finest pearls; the shells are also imported in vast quantities, the inner layer, known as "mother of pearl," being used for a great number of ornamental purposes. This species is found in various parts of the Indian and Pacific Oceans, at a depth of about twelve fathoms, where they are taken by divers. A considerable number of pearls are procured on the coasts of Panama, but many of them are of irregular form.

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THE PEARL-OYSTER.



THE PEARL-FISHERY.

The pearl-fisheries of the Persian Gulf have been known and resorted to from antiquity; at the present day the most important and extensive are near Arippo, on the western coast of Ceylon. The following description of these is given by the Count de Noé:

"The pearl-oysters lie in banks at greater or less depths in the sea. These banks occur on the western side of the island of Ceylon, about fifteen miles from the shore, where their average depth is about twelve fathoms. The fishery always commences in April—because the sea is at that time in its calmest state—and continues to the end of May. Not only are multitudes of natives attracted to the coast, but crowds of speculators from all parts of India, whose various language, manners, and dress are very striking and pleasing. The temporary abodes erected for them are also curious and picturesque. On the solitary shore, a collection of almost innumerable huts is at once seen to arise on the eve of the fishery. These huts are merely a few poles stuck in the ground, interwoven with light bamboos, and covered with cocoa-nut leaves, yet these slight habitations often shelter one hundred and fifty thousand persons.

"The signal for beginning the fishery is given at daybreak, by the discharge of a cannon, on which a countless fleet of boats, that have started from the shore at midnight, and, favored by a land breeze, have reached the banks before dawn, cast anchor on certain prescribed parts of the banks and proceed to work. Government vessels are on the spot, to prevent any boat from fishing beyond its proper limits. The boats of the fishers generally carry a captain, a pilot, and twenty men, ten of whom are experienced divers. The ten divers are divided into two companies of five each, and these companies plunge and relieve each other by turns.

"That they may descend through the water with greater rapidity to the bank round which the oysters are clustered, the divers place their feet on a stone attached to the end of a rope, the other end of which is made fast to the boat. They carry with them another rope, the extremity of which is held by two men in the boat, while to the lower part, that descends with the diver, there is fastened a net or basket. Besides these, every diver is furnished with a strong knife to detach the oysters, or serve as a defensive weapon in case he should be attacked by a shark. As soon as they touch, they gather the oysters with all possible speed, and having filled their net or basket, they quit their hold of the rope with the stone, pull that which is held by the sailors in the boat, and rapidly ascend to the surface of the sea.

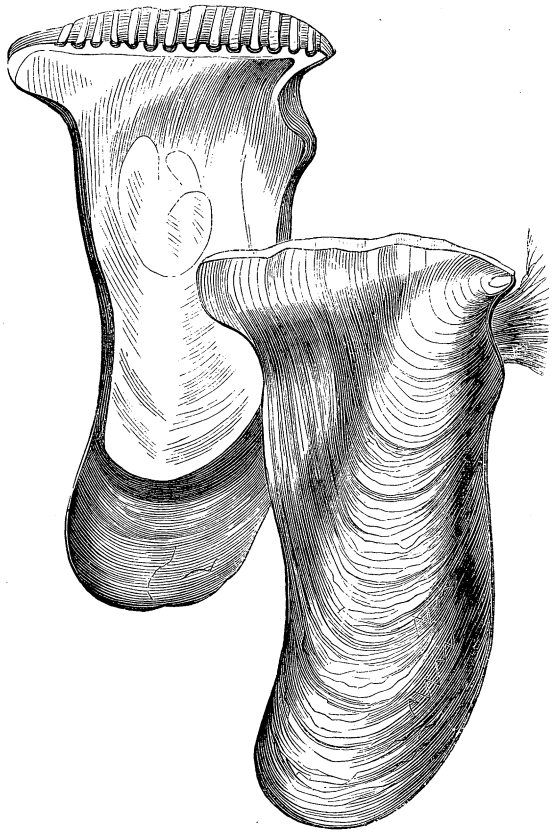
"The marvelous stories that are told of the length of time that these divers can remain under water have no foundation in truth.* All the evidence that can be depended upon

* On this subject there is strange contradiction. Captain Percival says that the divers usually remain under water two minutes, that they make forty to fifty plunges a day, and that instances have been known of divers who could remain below four, five, and even six minutes.

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establishes the fact that the most skillful cannot exceed and rarely endure the submersion of a minute.

"Alternately plunging and reposing, the divers continue their occupation until about ten o'clock in the forenoon, when the sea-breeze begins to blow, and one of the government vessels fires a gun, as a signal for the whole flotilla to return to shore. As soon as the boats reach the beach, an immense number of laborers, men, women, and children, rush to them and carry off the produce of the day's fishing. Every speculator has his own group of huts, and in the midst of each of these is a *couttô*, or space of ground inclosed with poles and transverse pieces of bamboo, but open to the air. In these couttôs are deposited the oysters as they are landed, and they are left to putrefy, which they soon do, under a burning sun. It is a curious fact, that though these numerous couttôs, each containing an enormous mass of oysters, all putrefy together on a narrow extent of soil, and emit the most detestable odors, yet the health of the precarious but crowded population gathered there, is no way affected.



THE PERNA ISOGNOMUM.

"As soon as the putrefaction is sufficiently advanced, the oysters are taken from the couttô and placed in troughs; sea-water is then thrown over them. In their putrid state the oysters easily yield the pearls they contain, and a number of men, all standing on the same side of the trough, rapidly shake them out and wash them. After all the shells are thrown out, the pearls remain on the sand at the bottom of the trough. . . .

"During the prosecution of this fishery, few places can be more animated than the western point of Ceylon. The oysters, or the cleansed pearls, are bought or sold on the spot, and besides this trade, the confluence of so many crowds from different countries attracts dealers in all sorts of merchandise. The long line of huts is a continuous bazaar, and all is life and activity. But, the fishery over, both natives and strangers depart, the huts are knocked down, scarcely a human habitation can be seen for miles, and the most dreary solitude prevails until the next year."

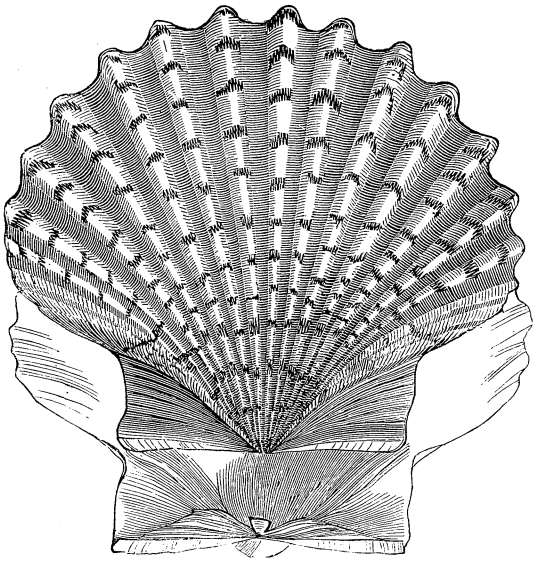
The Hammer Oyster, *Malleus vulgaris*, is a very curious species, the shell having the form of a hammer or pick-axe. The *Perna isognomum* has a somewhat similar form; it lives in deep water, attached to rocks by its byssus. Another species, the Coxcomb Oyster, *Ostrea crista-galli*, is curious from the shape of its shell. These are all found in the East Indian seas.

THE PECTINIDÆ.

These include the *Scallops*, genus *Pecten*, the shells of which are greatly admired on account of their beautiful forms and colors. They are abundant in some localities, and two species, *P. maximus* and *P. opercularis*, are esteemed good eating and are largely consumed in Europe. Another species, St. James's Cockle, *P. Jacobæus*, having been adopted in the Middle Ages as the badge of St. James of Spain, became also the distinction of the pilgrims returning from the Holy Land. About sixty living species of scallop are known, and several are common on our coasts; nearly as many fossil species have been identified. The *P. Magellanicus*, a large species, four to five

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inches long, is common at the mouth of the Connecticut river;* the *P. Islandicus* is of a reddish orange-color, two to three inches long, found on our northern coasts. The *P. concentricus* is a small species, and the most common along the coast of New York.



THE ST. JAMES' COCKLE.

THE OSTRACEA.

We now come to the most important of all the mollusca, in an economical point of view, the *Oyster*. Mankind appear at an early date to have been acquainted with its delicious flavor. Mr. Cozzens, in his "Prismatics," suggests the probability that although Adam was the great name-giver of early times, inasmuch as he lived inland, he "never saw the succulent periphery in its native mud; we may deduce the following reasonable conclusion, viz., that as he never saw it, he probably never *named* it—no, not to his most intimate friends." In tracing the history of the oyster in connection with mankind, this author seems to have come to the conclusion that its merits were first discovered in Great Britain—an idea perhaps suggested by the well-known fact that British oysters, even so far back as the time of the early emperors, were renowned among the epicures of Rome. The precise details of the discovery are given by this fanciful and humorous writer as follows:

"Methinks I see the First Oyster-Eater! a brawny, naked savage, with his wild hair matted over his wild eyes, a zodiac of fiery stars tattooed across his muscular breast: unclad, unsandaled, hirsute, and hungry, he breaks through the underwoods that margin the beach, and stands along upon the sea-shore, with nothing in one hand but his unsuccessful boar-spear, and nothing in the other but his fist. There he beholds a splendid panorama! The West all aglow, the conscious waves blushing as the warm sun sinks to their embraces, the blue sea on the left, the interminable forest on his right, and the creamy sea-sand curving in delicate tracery between —a picture and a child of nature! Delightedly he plunges into the foam, and swims to the bald crown of a rock that uplifts itself above the waves. Seating himself, he gazes upon the calm expanse beyond, and swings his legs against the moss that spins its filmy tendrils in the brine. Suddenly he utters a cry, springs up, the blood streaming from his foot. With barbarous fury he tears up masses of sea-moss, and with it clustering families of testacea. Dashing them down upon the rock, he perceives a liquor exuding from the fragments; he sees the white, pulpy, delicate morsel half hidden in the cracked shell, and instinctively reaching upward, his hand finds his mouth, and amid a savage, triumphant deglutition, he murmurs—Oyster!! Champing in his uncouth fashion bits of shell and sea-weed with uncontrollable pleasure, he masters this mystery of a new sensation, and not until the gray veil of night is drawn over the distant waters, does he leave the rock, covered with the trophies of his victory.

"We date from this epoch the Maritime History of England. Ere long the reedy cabins of her aborigines clustered upon the banks of beautiful inlets, and overspread her long lines of level beaches, or penciled with delicate wreaths of smoke the savage aspect of her rocky coasts. The sword was beaten into the oyster-knife, and the spear into oyster-rakes. Commerce spread her white wings along the shores of happy Albion, and man emerged at once into civilization from a

* Connecticut is noted for the excellence of its shad and shell-fish. The "Dragon Oysters," taken in the estuary of Dragon river, near New Haven are small, but of unrivaled flavor; unfortunately, the beds are nearly exhausted. The oysters of Norwal are also small, but are among the very best that are known. The *scallop* may be also found in great perfection at the restaurants of that thriving town.

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nomadic state. From this people arose the mighty nation of Ostragoths; from the Ostraphagi of ancient Britain came the custom of ostracism—that is, sending political delinquents to that place where they can get no more oysters."

Thus the oyster has its literature, and however deficient in wit itself, it is certainly the occasion of wit in others. The positive history of this mollusk goes back to the refined Athenians, who held it in high esteem as dainty food. The Romans also prized it, and as early as the second century they had adopted the practice of cultivating it in beds. Great Britain, so remarkable for its other fisheries,* excels all European countries in the production of oysters. They are found on most of the British and Irish shores, but those of Essex and Suffolk are esteemed the best. There are numerous artificial beds, where immense quantities are fed and fattened. The oysters are of various sizes and qualities, owing to difference of treatment and locality. Those on the coast of France, especially those of Dieppe, as well as many of the British oysters, have a greenish tinge, and also a coppery taste; it has been supposed, therefore, that they were impregnated with copper. This has been shown to be a mistake: the green color is caused by the oysters feeding on minute plants called *confervæ*, which grow in certain localities. The coppery taste is natural to the European species, and is esteemed a relishing quality to those who are accustomed to it. Americans are at first disgusted with it. In Europe the oyster is rarely cooked, but is served raw, it being esteemed not only more wholesome, but of higher relish in this condition.

All the species of oysters are hermaphrodite, as is also the fact in respect to the conchifera, or bivalve mollusks, generally. With a microscope immense numbers of the young oysters, with their shells, may be discovered in the parents—three to five thousand in each. When produced these are called *spats;* when quite small, they are taken and placed in the planting beds; in eighteen months they are fit for use. The spawning takes place in May, after which, for a time, the oysters are sick, and unfit for food. The young oyster usually fixes itself to some rock, and remains stationary for life; some, however, are free. These can move by a power of contraction in the foot. Oysters breathe by means of branchiæ or gills. They draw the water in at their mouth, which is a small opening in the upper part of the body, drive it down a long canal that constitutes the base of the gills, and so out again, retaining the air for the necessary functions of the body. Thus their ejecting the water seems to serve the double purpose of aiding the motion of such as are free, and of supplying the animals with air. Oysters fix themselves on the left side, which is the deep or concave side of the shell; in this manner they repose. The two shells, as in other bivalves, are connected by a powerful ligament, called the *adductor muscle.* By this they open and close the valves; when the animal dies this muscle becomes relaxed, and the shells gape open.

It is a question which often arises, how can the oysters, scallops, and other shell-fish which

* There is nothing more remarkable in the natural condition of Great Britain than the amazing abundance of fishes which haunt its waters. Gosse says: "The amount they contribute to the public wealth is immense, and they are regulated, even in many minute details, by repeated enactments of solemn legislation. An enumeration of the species which form the objects of our fisheries is itself startling—the surmullet, gurnards of half a dozen kinds, sea-bream, mackerel, scad, dory, atherine, gray mullet of two kinds, gar-fish, salmon, herring, pilchard, shad, cod, haddock, pout, whiting of two kinds, pollack, hake, ling, burbot, torsk, turbot, halibut, sole, flounder, plaice, dab, eels of three species, conger, thornback, skate of several kinds—are all taken in quantities and brought regularly to market, not to speak of many other kinds, such as perch, trout, char, pike, carp, tench, &c., which are taken for the table, chiefly from our rivers, or for individual amusement. The quantity of human food thus taken yearly from the water is enormous; an idea of it may be formed from the fact that of one species alone, and that a very local one, being confined to the western extremity of our island—the pilchard—the Cornwall fisheries yield twenty-one thousand hogsheads annually! What, then, must be the produce of all the species above enumerated all round the indented coasts of Britain and Ireland? We have no sufficient data to determine the commercial value of British fisheries, but it has been estimated by Sir John Barrow at £8,300,000 per annum."

To these we must add the British oyster-fisheries, which are probably equal to those of all the rest of Europe. In these marine products we find two of the principal sources—one physical and one moral—of the power of the United Kingdom; the sea not only furnishes an immense amount of food to the inhabitants, but its fisheries train up thousands and tens of thousands to familiarity with the sea, who consequently carry the ships of their country over every portion of the world. Thus it is that the commerce of England is without limit; thus it is that the sun never sets upon her vast domains, including one-sixth of the habitable globe. Dr. Franklin said every man who draws a fish from the water, finds a piece of money: England has abundantly proved the truth of this apothegm.

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are fixed to rocks for life, obtain food? Jones, in his "Structure of the Animal Kingdom," answers this question: "Wonderful indeed is the elaborate mechanism employed to effect the double purpose of renewing the respired fluid and feeding the helpless inhabitants of these shells. Every filament of the gill-fringe, examined under a powerful microscope, is found to be covered with countless cilia in constant vibration, causing, by their united efforts, powerful and rapid currents, which, sweeping over the entire surface of the gills, hurry toward the mouth whatever floating animalcules or nutritious particles may be brought within the limits of their action, and thus bring streams of nutritive atoms to the very aperture through which they are conveyed to the stomach, the lips and labial fringes acting as sentinels to admit or refuse entrance, as the matter supplied may be of a wholesome or pernicious character. So energetic, indeed, is the ciliary movement over the entire extent of the gills, that if any portion of them be cut off with a pair of scissors it immediately swims away, and continues to row itself in a given direction as long as the cilia upon its surface continue their movements." What is there more curious, more wonderful than this in the history of animated nature? Down in the hidden depths of the sea, on every shore, in every clime, in respect to myriads of the most helpless of his creatures, God bestows his care and works his miracles!

The COMMON OYSTER OF EUROPE is the *Ostrea edulis:* there are many other species—it is said not less than eighty—in different parts of the world, most of which are eaten. In tropical countries they are found growing to the branches and trunks of trees, especially those of the mangrove, which stand in the water. In these places the inhabitants often cut off a limb of a tree incrusted with oysters, by which means they obtain a supply. There are three species assigned to the United States, the NORTHERN OYSTER, *O. borealis*, the VIRGINIA OYSTER, *O. Virginica*, and the CANADIAN OYSTER, *O. Canadensis*. It is probable these are all one species; the fishermen recognize two general varieties, called *Chesapeake* and *York Bay*. The names of oysters in our markets are, however, very numerous, but they merely indicate the localities from which they are taken, or in which they are laid, with the qualities peculiar to each. In New York the most celebrated varieties are called *Blue Point* or *Rockaway*, *Shrewsbury*, and *East River*. The oyster-beds of New York are at Northport and other places in the East River, on the Jersey shore, the south side of Long Island, &c.

At Wellfleet, near Cape Cod, are the principal planting-beds of Massachusetts. Forty thousand bushels are annually brought here from the vicinity of New York and the borders of Chesapeake and Delaware Bays, and planted. The planting takes place in March, April, and May. In from seven to nine months the oysters are doubled in size; they are then taken up, the largest sent to market, and the rest replanted.

An immense quantity of oysters are procured on the coasts of Virginia, many of which are put down in the beds along the coasts of New York, Connecticut, and Massachusetts. Fresh oysters are supplied during the winter in kegs, or in air-tight cans, to Quebec, Montreal, Buffalo, Cleveland, Cincinnati, Louisville, St. Louis, and doubtless to St. Paul, Lecompton, and Omaha. They travel on the wings of steam, and with an energy which admits of neither rest or hindrance. They may not move like thought, by telegraph, but they are everywhere "in advance of the mails."*

The manner in which oysters are usually captured on our coast is by means of rakes or tongs, adapted to the purpose, with handles sometimes two or three fathoms long. When the water is too deep for these instruments, a strong iron drag or dredge is employed. The number of persons employed in this business amounts to many thousands. It is amazing that with such incessant attacks the oysters are not exterminated. Beside the ravages of man, the sea is full of active and vigilant enemies of this mollusk, whose only crime is its succulence. The star-fish is frequently found clasping the valves of the oyster in such a manner as to prevent its opening,

* The number of oysters annually used in Boston is estimated at one hundred thousand bushels, by Gould. The whole number annually used in the United States is variously estimated at from five to ten millions of bushels, in the shell. We have no means of ascertaining the number; but, if it be five millions of bushels, then one thousand millions of individual oysters are annually consumed. It is probable that the actual number is much greater than this, as oysters are taken along our coast for an extent of two thousand miles.

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and thus, as the fishermen say, it perishes by suffocation. Oppian, fifteen hundred years ago, charged the star-fish with similar atrocities:

"The prickly star creeps on with fell deceit,
To force the oyster from his close retreat.
When gaping lids their widen'd void display
The watchful star thrusts in a pointed ray;
Of all its treasures spoils the rifled case,
And empty shells the sandy hillocks grace."

Nor have we even yet mentioned all the calamities of the oyster; the insidious Drill—*Fusus cinereus*—punctures their shells by thousands, nay, by millions, and thus extracts the juices on which life depends. Many parts of the sea are paved with shells, bearing evidence of these submarine enormities. We need not pause to consider how like all this is to what we witness in every human town or city, where we constantly behold the shells of men who have been unconsciously drilled and sucked dry by the various kinds of sharp, sly, insidious Fusi Cinerei which live and breathe and have a fat, prosperous, and respectable being, among men.

Class VI. TUNICATA.

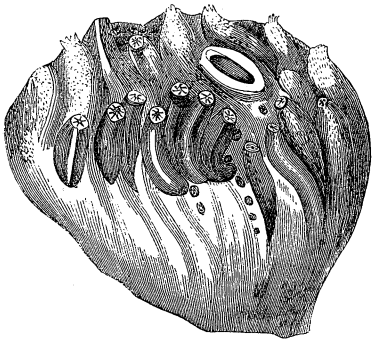
These animals present the appearance of shapeless gelatinous masses; they are composed of two tunics: the outer one is the mantle, and the inner one lines a large respiratory cavity. They are divided into two orders, the *Biphora* and *Ascidiæ*.

ORDER 1. BIPHORA.

This includes a group of free, swimming animals, usually of a glassy transparency, the bodies of which may be compared to a tube furnished with two openings, one for the entrance and the other for the exit of the water. Those of the genus *Salpa* possess an elastic external membrane, so transparent that the whole interior structure may be seen through it; by the contractions and expansions of this jets of water are created, which cause the animal to move along. The Salpæ are divided into *Aggregate* and *Solitary*, but these are only different states of the same species. They are minute animals, sometimes seen floating on the sea in long chains.

ORDER 2. ASCIDIÆ.

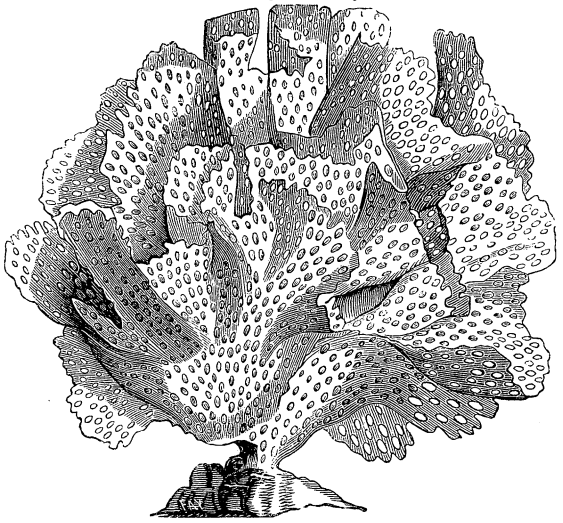
Forbes, in his "British Mollusca," says: "Rarely is the dredge drawn up from any sea-bed at all prolific in submarine creatures, without containing few or many irregularly-shaped, leathery bodies, fixed to sea-weed, rock, or shell, by one extremity or by one side, free at the other, and presenting two more or less prominent orifices, from which, on the slightest pressure, the sea-water is ejected with great force. On the sea-shore, when the tide is out, we find similar bodies attached to the under surface of rough stones. They are variously, often splendidly colored, but otherwise are unattractive, or even repulsive in aspect. These creatures are *Ascidiæ*, properly so called. Numbers of them are often found clustering among tangles, like branches of some strange semi-transparent fruit. They are very apathetic and inactive, living upon microscopic creatures drawn in with currents of water, by means of their ciliated respiratory organs. The leathery case is often incrusted with stones and shells, decorated with parasitical, though ornamental plumes of coral-lines, and not seldom perforated by bivalves, which lodge themselves snugly in the tough but smooth skin."



MASS OF COMPOUND ASCIDIANS MAGNIFIED.

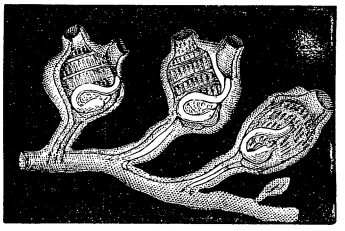
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These animals comprise several extensive groups or families. The *Compound Ascidians*, or *Botryllidæ*, are united together by the coalescence of their mantles, so as to form a leathery or gelatinous mass, usually attached to stones or sea-weed; in this the separate animals are imbedded round a common canal, many of them being adorned with beautiful colors, and these masses are of an almost infinite variety of forms. In some cases, the polypidom, or as it is generally called, the *Polyzoarium*, is a leaf-like, expanded calcareous mass, attached to a rock, the cells of the separate animals opening by hundreds on one surface only. The *Clavellinidæ*, or *Social Ascidians*, are united by means of a sort of creeping stem, which runs along the surface of submarine objects, and gives rise at intervals to short footstalks, at the extremity of which the animals are supported. The separate animals are produced by gemmation from the creeping stems, which run in various directions from the base of the original founder of the colony.



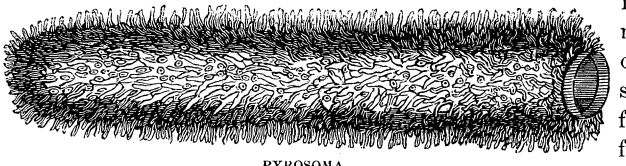
COMPOUND ASCIDIANS, MAGNIFIED.

The family of *Ascidiidæ*, or *Simple Ascidians*, is composed of animals which live separately, attached by the base to submarine bodies. They usually form shapeless masses of a cartilaginous texture, often of considerable size, which occur in great abundance in shallow water. A few species are eaten in some countries.



SOCIAL ASCIDIANS, MAGNIFIED.

The fourth family, the *Pyrosomatidæ*, agree closely with the salpæ in the general arrangement of their organs. The colonies of these singular creatures are in the form of a cartilaginous tube, open at one end. In the walls of this tube, formed by the coalescence of the mantles of the animals composing it, the bodies of the Ascidians are separately imbedded, the branchial chamber of each passing completely through the wall from its outer to its inner surface. These animals are found in the seas of warm climates, where they float along in an upright position, but apparently possess no actual locomotive power. Like all the Tunicata, they are luminous in the dark, and in fact appear to possess this faculty in a greater degree than any other members of the class. Their cylindrical form, upright position, and considerable size, which often exceeds a foot, render them exceedingly beautiful objects at night; and they have been described as resembling little columns of fire. Mr. George Bennett describes a scene which he witnessed at night in the Indian Ocean, in which a ship passed through a shoal of these animals a mile in width, shining like a liquid mass of pale greenish light. The scene was as novel as it was interesting.



PYROSOMA.

Class VII. BRYOZOA.

The term *Bryozoa* is derived from the Greek, *bruon*, moss, and *zoon*, an animal, and is descriptive of the animals of this class, which always grow together upon a common stock, in the same manner as the compound polypi, with which they were formerly arranged. Each animal resides

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in a separate cell, within which it can usually retract itself entirely; the cells are sometimes soft and flexible, sometimes horny, and sometimes calcareous. They frequently stand upon short foot-stalks, rising from a tubular stock, which creeps over the surface of stones and aquatic plants. In other cases the cells are sessile, forming a crust upon submarine objects, while in others the colony is attached only by its base, with the opposite extremity floating freely in the water. In these the stock is more or less branched and often leaf-like. They possess ciliated tentacula placed at the anterior extremity of the body. The colonies are increased by gemmiparous reproduction. The class is divided into two orders, the *Lophopoda* and *Infundibulata*.*

ORDER 1. **LOPHOPODA.**

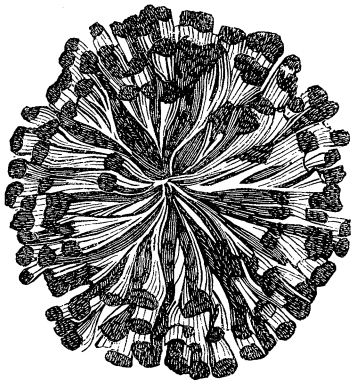
In this order, composed of inhabitants of fresh water, the tentacles, which are more numerous than in the preceding, are placed upon a pair of long arms, which spring from the sides of the upper extremity of the animal, and usually describe somewhat the form of a horse-shoe, as is seen in the *Plumatella*. Their cells are usually of a leathery texture, nearly transparent, and usually spring from a root-stock of similar consistence, which creeps along upon the surface of stones or aquatic plants, in which situations these animals are not uncommon. In some species, however, as in the *Cristatella*, the polypidom floats freely in the water, and is of a gelatinous consistency; in these the animals composing each colony are usually three or four in number.



PLUMATELLA.

ORDER 2. **INFUNDIBULATA.**

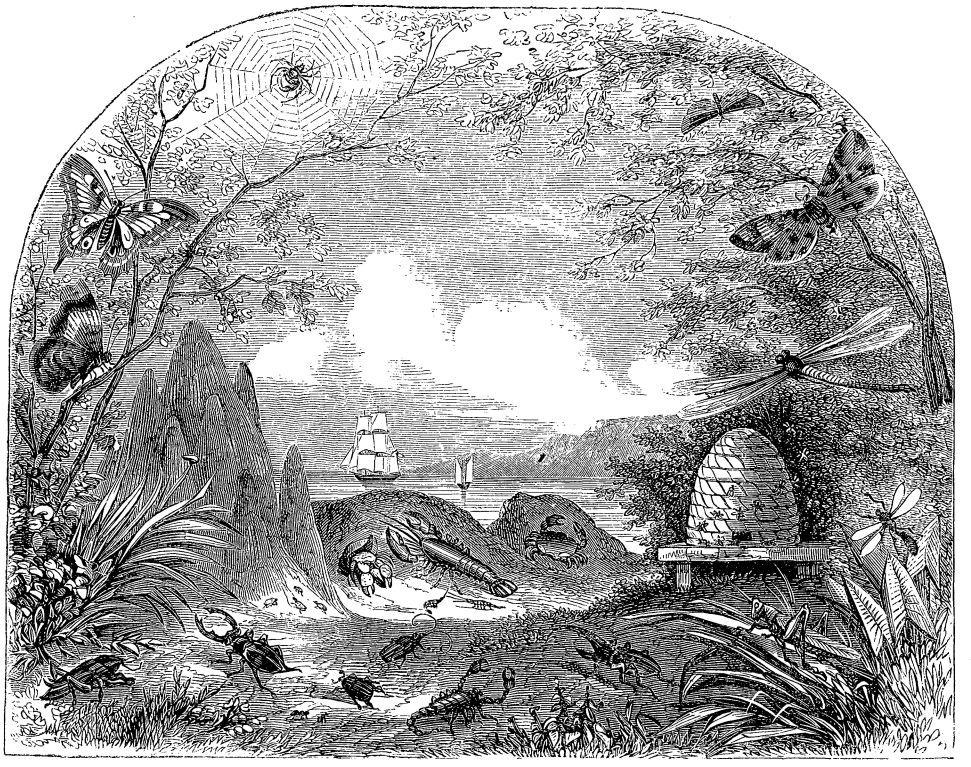
This order derives its name from *infundibulum*, a funnel. It includes a great number of genera, presenting an infinite variety of structure. The common *Flustræ*, or *Sea-Mats*, are flat and foliaceous in their form, presenting a considerable resemblance in appearance to pale-brown sea-weeds, with which they are in fact generally confounded by sea-side visitors. But when carefully examined, these leaf-like bodies will be found to consist of a multitude of small horny cells, opening at the surface; and from each of these, when the polypidom is placed alive in a vessel of sea-water, the little creatures may be seen protruding their tentacles. Many nearly allied species grow upon the fronds of sea-weeds, over which they spread like a thin coating of gauze, composed of similar cells, opening of course only on one side. Others are found incrusting stones and other submarine bodies with a cellular calcareous mass. In many species the cells are arranged so as to form a more or less threadlike, branching polypidom; while others are furnished with a creeping root, from which the cells rise by stems of greater or less length. All the Infundibulata are marine animals.



FLUSTRA AVICULARIA; NATURAL SIZE.

* The *Tunicata* and *Bryozoa*—the *Pyrozoa* of some authors—were formerly arranged with the Polypi, though now placed with the Mollusca; they are, however, so peculiar in certain respects as to constitute with some naturalists a separate division under the name of *Molluscoides*.

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Division III. ARTICULATA.

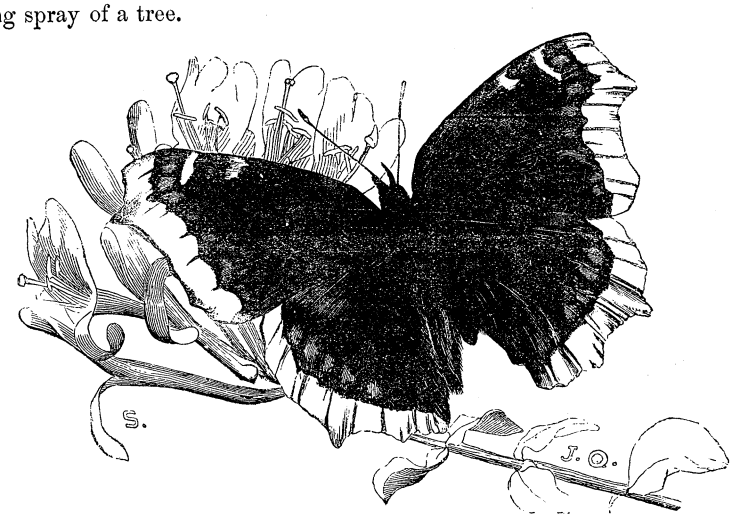
The term *Articulata* is derived from the Latin *articulus*, a joint, and is applied to animals in which the different portions of the body are composed of movable pieces, *articulated*, that is, jointed, to each other. As we have given in a previous part of this work (Vol. I., pp. 19, 20), a general description of the structure and physiology of this great division of the Animal Kingdom, it is not necessary to enter into further details on the subject here. At pages 28 and 29 of the same volume will be found the classification of the Articulata which we have adopted, including the following eight classes: *Insecta*, *Myriopoda*, *Arachnida*, *Crustacea*, *Rotifera*, *Annelida*, *Nematelmia*, and *Platyelmia*.

Class I. INSECTA.

The Class of *Insects*—beetles, bees, wasps, ants, butterflies, moths, flies, gnats, mosquitoes, fleas, cockroaches, bed-bugs, grasshoppers, lice, &c., &c.—includes more than a hundred thousand known and recorded species. This innumerable host, in whatever light we view them, always present many points of the highest interest to our observation. Whether we consider the history of their curious transformations, their extraordinary and often beautiful forms and colors, their wonderful instincts, and the close approach to reason exhibited by some of them; their effect upon our persons and property, or the extraordinary means by which nature avails herself of the instincts of some species to put a check upon the ravages of others—we always meet with much to command our admiring attention; sufficient, in fact, to render *Entomology*, the study of insects, one of the most attractive pages of the book of Nature. It has, moreover, this additional

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recommendation, that it is one of those branches of Zoology that may be pursued in any situation. Insects abound everywhere, and wherever they occur, their habits may be observed and their structure investigated. "They appear," if we may use the beautiful language of Kirby and Spence, "to have been nature's favorite productions, in which, to manifest her power and skill, she has combined and concentrated almost all that is either beautiful and graceful, interesting and alluring, or curious and singular, in every other class and order of her children. To these, her valued miniatures, she has given the most delicate touch and highest finish of her pencil. Numbers she has armed with glittering mail, which reflects a luster like that of burnished metals; in others she lights up the dazzling radiance of polished gems. Some she has decked with what looks like liquid drops, or plates of gold and silver; or with scales or pile, which mimic the color and emit the ray of the same precious metals. Some exhibit a rude exterior, like stones in their native state, while others represent their smooth and shining face, after they have been submitted to the tool of the polisher; others again, like so many pigmy Atlases bearing on their backs a microcosm, by the rugged and various elevations and depressions of their tuberculated crust, present to the eye of the beholder no unapt imitation of the unequal surface of the earth—now horrid with misshapen rocks, ridges and precipices, now swelling into hills and mountains, and now sinking into valleys, glens, and caves; while not a few are covered with branching spines, which fancy may form into a forest of trees. What numbers vie with the charming offspring of Flora in various beauties!—some in the delicacy and variety of their colors not like those of flowers, evanescent and fugitive, but fixed and durable, surviving their subject, and adorning it as much after death as they did when it was alive; others again in the veining and texture of their wings; and others in the rich cottony down that clothes them. To such perfection, indeed, has nature in them carried her mimetic art, that you would declare, upon beholding some insects, that they had robbed the trees of their leaves to form for themselves artificial wings, so exactly do they resemble them in their form, substance, and vascular structure; some representing green leaves, and others those that are dry and withered. Nay, sometimes this mimicry is so exquisite that you would mistake the whole insect for a portion of the branching spray of a tree.



THE MOURNING-CLOAK BUTTERFLY.

"In fishes, the lucid scales of varied hue that cover and defend them are universally admired, and esteemed their peculiar ornament; but place a butterfly's wing under a microscope—that avenue to unseen glories in new worlds—and you will discover that nature has endowed the most numerous of the insect tribes with the same privilege, multiplying in them the forms, and diversifying the coloring of this kind of clothing, beyond all parallel. The rich and velvet tints of the plumage of birds are not superior to what the curious observer may discover in a variety of Lepidoptera, and those many-colored eyes which deck so gloriously the peacock's tail are imi-

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tated with success by one of our most common butterflies. Feathers are thought to be peculiar to birds, but insects often imitate them in their antennæ, wings, and even sometimes in the covering of their bodies. We admire with reason the coats of quadrupeds, whether their skins be covered with pile, or wool, or fur, yet are not perhaps aware that a vast variety of insects are clothed with all these kinds of hair, but infinitely finer and more silky in texture, more brilliant and delicate in color, and more variously shaded than what any other animals can pretend to.

"In variegation, insects certainly exceed every other class of animated beings. Nature, in her sportive mood, when painting them sometimes imitates the clouds of heaven; at others, the meandering course of the rivers of the earth, or the undulations of their waters; many are veined like beautiful marbles; others have the semblance of a robe of the finest net-work thrown over them; some she blazons with heraldic insignia, giving them to bear in fields sable, azure, vert, gules, argent, and or, fesses, bars, bends, crosses, crescents, stars, and even animals. On many, taking her rule and compasses, she draws with precision mathematical figures: points, lines, angles, triangles, squares, and circles. On others she portrays, with mystic hand, what seem like hieroglyphic symbols, or inscribes them with the characters and letters of various languages, often very correctly formed; and what is more extraordinary, she has registered in others figures which correspond with several dates of the Christian era.

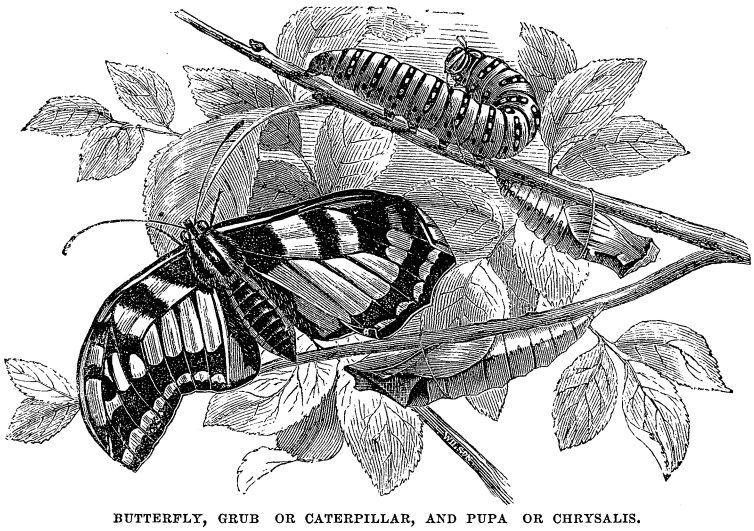
"Nor has nature been lavish only in the apparel and ornament of these privileged tribes; in other respects she has been equally unsparing of her favors. To some she has given fins like those of fish, or a beak resembling that of birds; to others horns, nearly the counterparts of those of various quadrupeds. The bull, the stag, the rhinoceros, and even the hitherto vainly sought-for unicorn, have in this respect many representatives among insects. One is armed with tusks not unlike those of the elephant; another is bristled with spines, as the porcupine and hedgehog with quills; a third is an armadillo in miniature; the disproportioned hind-legs of the kangaroo give a most grotesque appearance to a fourth; and the threatening head of the snake is found in a fifth. It would, however, be endless to produce all the instances which occur of such imitations, and I shall only remark that, generally speaking, these arms and instruments in structure and finishing far exceed those which they resemble.

"But further: insects not only mimic, in a manner infinitely various, every thing in nature, they may also with very little violence be regarded as symbolical of beings out of and above nature. The butterfly, adorned with every beauty and every grace, borne by radiant wings through the fields of ether, and extracting nectar from every flower, gives us some idea of the blessed inhabitants of happier worlds, of angels, and of the spirits of the just arrived at their state of perfection. Again, other insects seem emblematical of a different class of unearthly beings, when we behold some, tremendous for the numerous horns and spines projecting in horrid array from their head or shoulders; others for their threatening jaws of fearful length, and armed with cruel fangs; when we survey the dismal hue and demoniac air that distinguish others, the dens of darkness in which they live, the impurity of their food, their predatory habits and cruelty, the nets which they spread, and the pits which they sink to entrap the unwary, we can scarcely help regarding them as aptly symbolizing evil demons, the enemies of man, or impure spirits, for their vices and crimes driven from the regions of light into darkness and punishment."

The various arts and industry of insects have excited the admiration of every attentive observer. "The lord of the creation," say the authors we have just quoted, "plumes himself upon his powers of invention, and is proud to enumerate the various useful arts and machines to which they have given birth, not aware that '*He who teacheth man knowledge*' has instructed these despised insects to anticipate him in many of them. The builders of Babel doubtless thought their invention of turning earth into artificial stone a very happy discovery; yet a little bee had practiced this art, using indeed a different process, on a small scale, and the white ants on a large one, ever since the world began. Man thinks that he stands unrivaled as an architect, and that his buildings are without a parallel among the works of the inferior orders of animals. He would be of a different opinion did he attend to the history of insects: he would find that many of them have been architects from time immemorial; that they have had their houses divided into various apartments, and containing staircases, gigantic arches, domes, colonnades, and the

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like; nay, that even tunnels are excavated by them so immense, compared with their own size, as to be twelve times bigger than that of Brunel under the Thames. The modern fine lady, who prides herself on the luster and beauty of the scarlet hangings which adorn the stately walls of her drawing-room, or the carpets that cover its floor, fancying that nothing so rich and splendid was ever seen before, and pitying her vulgar ancestors who were doomed to unsightly whitewash and rushes, is ignorant all the while that before she or her ancestors were in existence, and even before the boasted Tyrian dye was discovered, a little insect had known how to hang the walls of its cell with tapestry of a scarlet more brilliant than any her rooms can exhibit, and that others daily weave silken carpets both in tissue and texture, infinitely superior to those she so much admires. No female ornament is more prized and costly than lace, the invention and fabrication of which seems the exclusive claim of the softer sex. But even here they have been anticipated by these industrious little creatures, who often defend their helpless chrysalis by a most singular covering, and as beautiful as singular, of lace. Other arts have been equally forestalled by these creatures. What vast importance is attached to the invention of paper! For nearly six thousand years one of our commonest insects has known how to make and apply it to its purposes; and even pasteboard, superior in substance and polish to any thing we can produce, is manufactured by another. We imagine that nothing short of human intellect can be equal to the construction of a diving-bell or an air-pump, yet a spider is in the daily habit of using the one, and what is more, one exactly similar in principle to ours, but more ingeniously contrived, by means of which she resides unwetted in the bosom of the water, and procures the necessary supplies of air by a much more simple process than our alternating buckets; and the caterpillar of a little moth knows how to imitate the other, producing a vacuum, when necessary for its purposes, without any piston beside its own body. If we think with wonder of the populous cities which have employed the united labors of man for many ages to bring them to their full extent, what shall we say to the white ants, which require only a few months to build a metropolis capable of containing an infinitely greater number of inhabitants than even imperial Nineveh, Babylon, Rome, or Pekin in all their glory?"



BUTTERFLY, GRUB OR CATERPILLAR, AND PUPA OR CHRYSALIS.

The metamorphoses of insects have been noted as among the wonders of nature from the earliest ages. "The butterfly which amuses you with its aerial excursions, one while extracting nectar from the tube of the honeysuckle, and then, the very image of fickleness, flying to a rose, as if to contrast the hue of its wings with that of the flower on which it reposes, did not come into the world as you now behold it. At its first exclusion from the egg, and for some months of its existence afterward, it was a worm-like caterpillar, crawling upon sixteen short legs, greedily devouring leaves with two jaws, and seeing by means of twelve eyes so minute as to be nearly

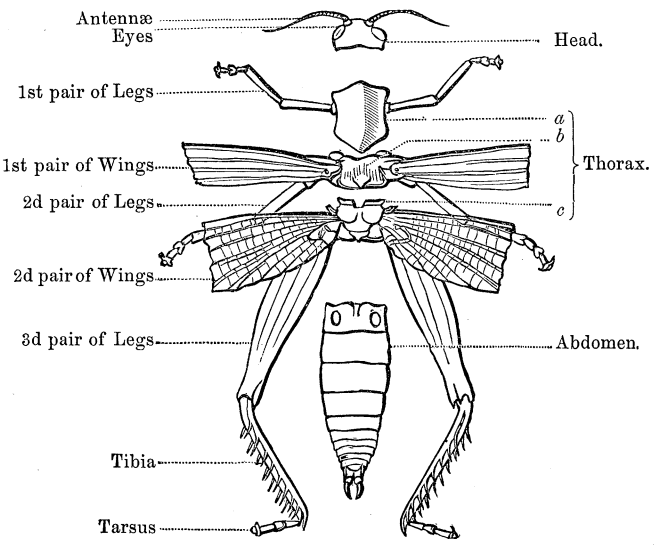
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imperceptible without the aid of a microscope. You now view it furnished with wings capable of rapid and extensive flights; of its sixteen feet, ten have disappeared, and the remaining six are in most respects wholly unlike those to which they have succeeded; its jaws have vanished, and are replaced by a curled-up proboscis, suited only for sipping liquid sweets; the form of its head is entirely changed; two long horns project from its upper surface; and instead of twelve invisible eyes, you behold two, very large, and composed of at least seventeen thousand convex lenses, each supposed to be a distinct and effective eye!

"Were you to push your examination further, and by dissection to compare the internal conformation of the caterpillar with that of the butterfly, you would witness changes even more extraordinary. In the former you would find some thousands of muscles, which in the latter are replaced by others of a form and structure entirely different. Nearly the whole body of the caterpillar is occupied by a capacious stomach. In the butterfly it has become converted into an almost imperceptible thread-like viscus; and the abdomen is now filled by two large packets of eggs, or other organs not visible in the first state. In the former, two spirally-convoluted tubes were filled with a silky gum; in the latter, both tubes and silk have almost totally vanished, and changes equally great have taken place in the economy and structure of the nerves and other organs.

"What a surprising transformation! Nor was this all. The change from one form to the other was not direct. An intermediate state not less singular intervened. After casting its skin, even to its jaws, several times, and attaining its full growth, the caterpillar attached itself to a leaf by a silken girth; its body greatly contracted, its skin once more split asunder, disclosing an oviform mass, without exterior mouth, eyes, or limbs, and exhibiting no other symptom of life than a slight motion when touched. In this state of death-like torpor, and without tasting food, the insect existed for several months, until at length the tomb burst, and out of a case not more than an inch long and a quarter of an inch in diameter, proceeded the butterfly before you, which covers a surface of nearly four inches square. Almost every insect which you see has undergone a transformation as singular and surprising, though varied in many of its circumstances."

From these striking and beautiful general views, we must pass to a particular description of the wonderful races under consideration. Insects, in their perfect state, are distinguished from the other articulate animals by the possession of six legs and two antennæ, and by the division of the body into three distinct regions, the *head*, *thorax*, and *abdomen*, as exhibited in the annexed figure.



ANATOMY OF THE EXTERNAL SKELETON OF AN INSECT.

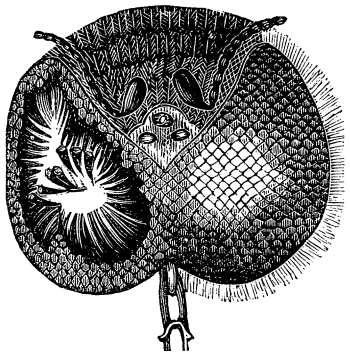
The second of these divisions bears the organs of motion. Insects respire by tracheæ, are generally furnished with wings, and almost always undergo a series of transformations or *metamorphoses* before arriving at their mature and reproductive form.

Their bodies are composed of distinct rings or segments, and these are generally of a horny consistency, united to each other by a membraneous skin which gives flexibility to the whole. In some cases, however, the skin is of a softer texture; but even in these it presents sufficient firmness for the attachment of the muscles, and the tubes composing the limbs are generally of a harder consistence than the rest of the integument. The number of segments of which the body of an insect is normally com-

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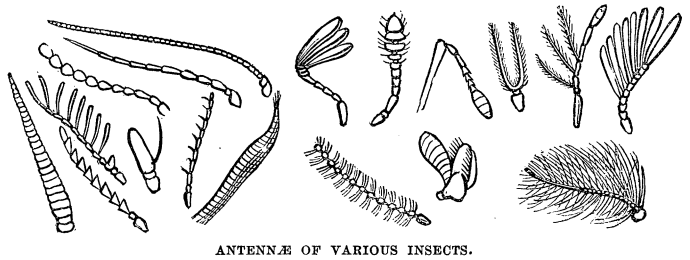
posed is thirteen; but some of them are occasionally amalgamated together, or concealed by the others, so as to make it appear that fewer segments are present.

The first segment, or the head, is composed of a single piece, which bears the eyes, the antennæ, and the organs of the mouth. The eyes, which are among the most wonderful objects in nature, are almost always of the kind called *compound*, that is to say, they consist of a multitude of little hexagonal facets, brought close together on each side of the head, each furnished with a cornea, a lens, a coating of pigment, and a nervous filament, and being in fact a true eye. The number of these minute organs is sometimes most extraordinary. The eye of the common house-fly has four thousand of them; that of a dragon-fly more than twelve thousand; that of a butterfly observed by Puget, seventeen thousand three hundred and twenty-five; and that of a small species of beetle—*Mordella*—no less than twenty-five thousand. In addition to these compound eyes, many insects also possess two or three *ocelli*, or simple eyes, placed on the head between the large compound organs; these appear to be very similar in their structure to the individual eyes of which the compound eyes are composed.



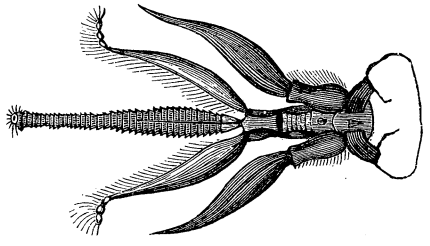
HEAD AND EYES OF THE BEE AS MAGNIFIED BY THE MICROSCOPE.

The antennæ are usually attached to the front of the head, between the eyes. They are exceedingly variable in their form, and probably vary considerably in function, although their general office appears to be that of organs of touch. In some instances, however, their conformation appears to indicate that they are the organs of some special sense, and the functions of smell and hearing have been attributed to them by different observers. In their most ordinary and simple form, they are more or less filiform organs, composed of a very variable number of joints. Sometimes they are thickened at the base, sometimes at the apex. In some cases the whole or part of the joints are furnished with one or more processes, bristles, or hairs, giving the entire organ a comb-like or feathered appearance.



ANTENNÆ OF VARIOUS INSECTS.

The structure of the mouth in insects exhibits very remarkable modifications, and these are of the utmost importance in the classification of these creatures. In some insects the mouth is formed exclusively for biting; in others, as exclusively for suction; while in others again it is fitted for the performance of both these actions; and the form of its constituent parts of course undergoes corresponding changes; but the same organs really exist in all, modified in appearance, indeed, so as sometimes to be scarcely recognizable. In the bees the organs of the mouth are adapted at once for biting and for suctional purposes, the elongated tongue constituting a tube through which their fluid nourishment can be drawn in. In the butterflies the suctorial organ consists of a long trunk; in the bugs it is a jointed rostrum; in the diptera, or two-winged flies, a fleshy process, &c. The wings, legs, and feet are variously adapted to different species.

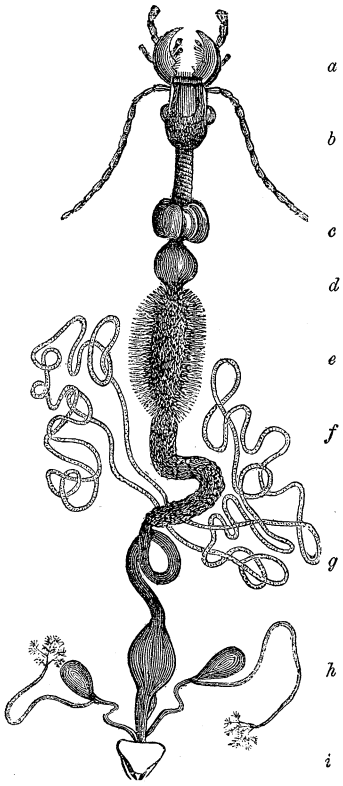


MOUTH AND TONGUE OF THE BEE, MAGNIFIED.

The abdomen consists generally of nine segments; in some instances these are attached edge to edge, when the abdomen exhibits little or no flexibility; in other cases, each segment slides

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at its base within the one preceding it, so that the whole is capable of bending to a certain distance in some directions. The orifice of the generative organs is situated at the extremity of the abdomen; the female is furnished with instruments of very various structure, adapted for placing the eggs in the situation most proper for their development. The apex of the abdomen is also sometimes furnished with long filiform tails, sometimes with bristle-like organs, by means of which the insect effects considerable leaps. In the cockroaches, and some other insects, they form stout-jointed bristles, resembling short antennæ. In the earwigs they constitute a powerful pair of forceps, often of great length; while the aphides are furnished with a pair of tubular appendages, from which a sweet juice exudes.



DIGESTIVE APPARATUS OF AN INSECT.

a, head, antennæ, &c.; *b*, pharynx; *c*, crop; *d*, gizzard; *e*, chyle-forming stomach; *f*, biliary vessels; *g*, small intestine; *h*, secreting organs; *i*, anus.

The intestinal canal always forms a tube of variable width, formed of three membraneous layers, running from one extremity of the body to the other, commencing behind the mouth in a narrow œsophagus, and usually terminating posteriorly in a somewhat dilated cavity, the *cloaca*, which also receives the termination of the internal generative organs. The œsophagus leads first into a membraneous, and usually folded stomach, the *crop;* from this, in the masticating insects, the food passes into a second stomach, which, from its being furnished with horny plates and other organs for the comminution of the food, has received the name of *gizzard*. Behind this is the true stomach, in which the process of chylification goes on. This is often covered with little villi, or furnished with glandular organs, which appear to secrete a gastric juice of some kind. The remainder of the canal forms the intestine, which is usually of a tubular form, and is very variable in length, sometimes running to the anal opening with but little deviation; while in other cases it forms several convolutions in the anterior of the abdomen.

The nervous system of insects generally consists of a brain placed above the œsophagus, with ganglia variously distributed in the different species. The organs of sense are possessed in different degrees by different races. Insects are unisexual, with very few exceptions. Their reproduction is essentially oviparous, though some species are ovo-viviparous. The aphides are truly viviparous, at certain periods, the young being produced apparently by a sort of internal gemmation.*

* With respect to the number of eggs laid by insects, it varies in different species. The flea, for example, lays about twelve, and many diptera and coleoptera average, perhaps, fifty; but others are far more prolific. Among moths, for example, the silk-worm produces five hundred, and some from one thousand to two thousand. The wasp, *Vespa vulgaris*, deposits three thousand; the ant, *Formica*, from four thousand to six thousand; and Kirby and Spence consider that, in one season, the number laid by the queen bee may amount to forty or fifty thousand, or more; yet, surprising as this latter statement may appear, the fecundity of the queen bee is far inferior to that of the white ant, *Termes fatalis*; for the female of this insect extrudes from her enormous matrix innumerable eggs, at the rate of sixty in a minute, which gives 3,600 in an hour, 86,400 in a day, 2,419,200 in a lunar month. How long the process of oviposition continues in the termite is unknown; but if it were prolonged throughout the entire year, the amazing number of 211,449,600 eggs would proceed from one individual; setting, however, the number as low as possible, it will exceed that produced by any known animal in the creation.

The *Aphides*, or plant-lice, furnish a remarkable instance of fecundity. In these insects, it has been satisfactorily ascertained by Bonnet, Lyonnet and Réaumur, that a single sexual intercourse is sufficient to impregnate, not only the female parent, but all her progeny down to the ninth generation! The original insect still continues to lay when the ninth family of her descendants is capable of reproduction, and Réaumur estimated that, even at the fifth generation, a single aphis might be the great-great-grandmother of 5,904,900,000 young ones.

The impregnated ova of the aphis are deposited, at the close of summer, in the axils of the leaves, either of the plant infested by the species, or of some neighboring plant, and the ova, retaining their latent life through the winter, are

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Although we have already noticed the wonderful transformations which insects undergo, we must still give a more detailed account of them. As has been stated, in their regular development from the egg they in general pass through a certain series of changes, which together constitute what is called the *metamorphosis*, the young animal on emerging from the egg generally exhibiting an appearance very different from what it is ultimately destined to assume. The degree of this metamorphosis is, however, very different in different groups of insects. In its most complete form, as exemplified in the butterflies, moths, beetles, and many other insects, the metamorphosis takes place in three very distinct stages. In the first, which is called the *larva* state, the insect has the form of a grub, sometimes furnished with feet, sometimes destitute of those organs. Different forms of insects in this state are popularly known as *caterpillars*, *grubs*, and *maggots*. During this period of its existence the whole business of the insect is eating, which it usually performs most voraciously, changing its skin repeatedly to allow for the rapid increase in its bulk; and after remaining in this form for a certain time, which varies greatly in different species, it passes to the second period of its existence, in which it is denominated a *pupa* or *chrysalis*. In this condition the insect is quiescent, neither eating nor moving. It is sometimes completely inclosed in a horny case, in which the position of the limbs of the future insect is indicated by ridges and prominences; sometimes it is covered with a case of a softer consistence, which fits closely round the limbs, as well as the body, thus leaving the former a certain amount of freedom. Pupæ of this description are sometimes inclosed within the dried larva skin, which then forms a horny case for the protection of its tender and helpless inmate. After lying in this manner, with scarcely a sign of life, for a longer or shorter period, the insect, arrived at maturity, bursts from its prison in the full enjoyment of all its faculties. It is then said to be in the *imago* or perfect state.

This metamorphosis is one of the most remarkable phenomena in the history of insects, and was long regarded as perhaps the most marvelous thing in nature, although recent researches have shown that the history of many of the lower animals presents us with circumstances equally if not still more wonderful. Nevertheless, the metamorphosis of the higher insects is a phenomenon which cannot fail to arrest our attention. To see the same animal appearing first as a soft worm-like creature, crawling slowly along, and devouring every thing that comes in its way, and then, after an intermediate period of death-like repose, emerging from its quiescent state, furnished with wings, adorned with brilliant colors, and confined in its choice of food to the most delicate fluids of the vegetable kingdom, is a spectacle that must be regarded with the highest interest, especially when we remember that these dissimilar creatures are all composed of the same elements, and that the principal organs of the adult animal were in a manner shadowed forth in all its previous stages.

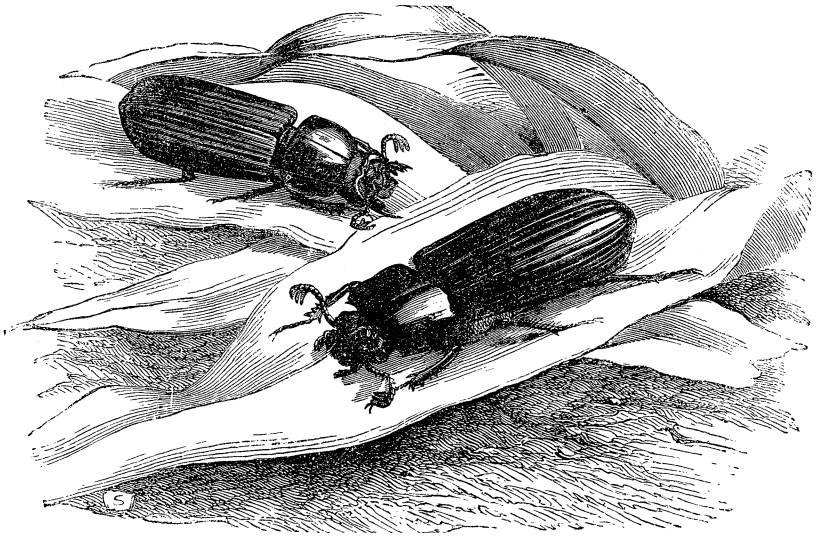
But although the majority of the class of Insects undergo a complete metamorphosis of this description, there are many in which the only transformation consists in a series of changes of skin, without any interval of rest, the larva, which from the first presents a certain degree of resemblance to its parents, gradually acquiring those organs which it originally wanted. In this metamorphosis, which is called *incomplete*, the principal difference between the larva and the imago consists in the absence of wings, which first make their appearance in the form of thick lobes, inclosed in cases, in the course of the last changes of the skin. The joints of the antennæ and tarsi are also sometimes fewer in number; and the ocelli, or simple eyes, are generally wanting in the larva when present in the perfect insect. In some insects, such as the dragon-flies, the May-flies, and some others, the larvæ, which are aquatic, present a greater difference from

hatched by the returning warmth of spring, giving birth to a wingless, hexapod larva. This larva, if circumstances —such as warmth and food—be favorable, *will produce a brood, or, indeed, a succession of broods, of eight larvæ like itself without any connection with the male.* In fact no winged females have at this season appeared. If the virgin progeny be also kept from any access to the male, each will again produce a brood of the same number of aphides, and careful experiments prove that this procreation from a virgin mother will continue to the seventh, the ninth, or the eleventh generation, before the spermatic virtue of the ancestral coitus be exhausted. In the last larval brood, individual growth and development proceed farther than in the parent, and some individuals become metamorphosed into winged males—others into oviparous females. By these the ova are developed, impregnated, and oviposited, and thus provision is made for disseminating the individuals, and for continuing the existence of the species over the severe famine months of winter.

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the perfect insect than in the cases above referred to, although the pupa is active and continues to feed until the time of its arrival at the imago state. We may therefore call this a *sub-complete* metamorphosis. Lastly, a few insects, which possess no wings in the perfect state, undergo no change, except in size, from the time of their emerging from the egg to that of their reaching maturity.

The immense number of insects, and their diversified forms, habits, and endowments, have rendered their classification a matter of great labor, and often of extreme embarrassment. In the account we propose to give, we shall chiefly aim at simplicity of arrangement, and endeavor to select from the endless mass of species only those which may be considered as possessing some peculiar point of interest. Referring the reader to Vol. I., page 28, for the details of our classification, we need only state here that we shall notice the Class of Insects under the following thirteen orders: *Coleoptera*, *Strepsiptera*, *Hymenoptera*, *Lepidoptera*, *Diptera*, *Aphaniptera*, *Neuroptera*, *Orthoptera*, *Physopoda*, *Rhynchota*, *Thysanura*, *Mallophaga*, and *Anoplura*.



THE SUGAR BEETLE—PASSALUS.

ORDER 1. **COLEOPTERA.**

Coleoptera is derived from the Greek *koleos*, a sheath, and *ptera*, wings, and includes the *Beetles* or *Sheath-winged Insects*, of which nearly forty thousand species are known. Their leading characteristic, alluded to in the name of the order, consists in the leathery or horny texture of the anterior wings, called *elytra* by naturalists, which serve as sheaths for the posterior wings in repose, and generally meet in a straight line down the back. The posterior wings are membraneous, and much larger than the anterior pair; they are the sole organs of flight, and are folded both longitudinally and transversely, when not in use. The mouth is formed for biting; the mandibles are almost always strong, somewhat triangular, horny organs, which, in the predaceous beetles, are hooked and sharp at the points, and often armed with acute teeth on the inner margin; while in many herbivorous species, the inside of the basal portion is transversely ridged, to fit the jaws for the comminution of vegetable substances. In some beetles, which feed upon fluid matters, the mandibles are dilated into membraneous hairy plates. In some cases, as in the common stag-beetle, the mandibles are of great size, and some allied species have them still larger. The maxillæ exhibit differences in form corresponding with those of the mandibles.

The other organs attached to the head are the antennæ and the eyes. The antennæ are generally composed of from nine to eleven joints, and are inserted upon the forehead between the eyes, sometimes close to those organs, sometimes more in the middle of the head. Compound eyes exist in nearly all beetles; they are placed on the sides of the head, and are generally of a

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more or less spherical form, sometimes oval or kidney-shaped, and in a few cases divided into two parts by an elevated ridge, so that the insect appears to have four eyes; while in a few beetles, inhabiting caves or other subterranean situations, the eyes are entirely wanting.

The thoracic segments are always distinctly separated. The prothorax is usually of considerable size, and bears the first pair of legs. The mesothorax and metathorax bear the other two pairs of legs and the elytra and wings, beneath which their upper surface is entirely concealed, with the exception of a small triangular piece of the mesothorax—the *scutellum*—which is usually visible at the base of the suture. The elytra generally cover the entire dorsal surface of the body to the apex of the abdomen, and the upper portion of these segments is then of a soft and somewhat membraneous texture; but in some cases the elytra are short, leaving a greater or less portion of the abdomen uncovered; this is then equally horny on both surfaces. In some cases the wings are wanting, when the elytra are not unfrequently completely soldered together.



HERCULES BEETLE.

The legs are usually constructed exclusively for walking; but in some cases the fore-legs are converted into fossorial organs, and in others the hind-legs are flattened for swimming, or furnished with thickened thighs for saltatorial purposes. The tarsi are generally composed of five joints, and this appears to be the normal number. The number varies, however, in different groups from two to five.

The metamorphosis of the Coleoptera is complete; the larva is usually a soft fleshy grub, although the texture of its integuments is often leathery, or even somewhat horny, especially in the rapacious species. The soft larvæ are almost always furnished with a horny head, armed with distinct jaws, and usually furnished with simple eyes. They are generally furnished with six thoracic legs, although these are sometimes wanting, and frequently also with anal pro-legs. The pupæ are free and quiescent.

We shall notice the insects of this order under the following subdivisions: the *Pentamera*, the *Heteromera*, *Tetramera*, and *Trimera*.

THE PENTAMERA.

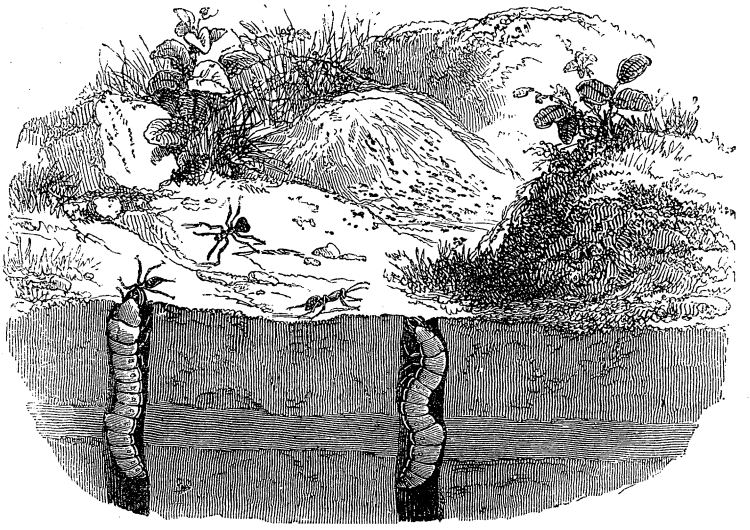
This term, derived from the Greek *pente*, five, and *mera*, divisions, is applied to the insects of this group, as most of the species have their tarsi composed of five distinct joints; they are, however, very numerous, and there are great variations in structure.

THE GEODEPHAGA.

This term signifies *Ground-Beetles*, and is descriptive of the tribe. They are exceedingly active, and often beautiful insects; generally nocturnal in their habits, concealing themselves during the day under stones and in holes in the ground. The larvæ are elongated, flattened, and usually covered with a horny integument. In their predaceous habits they resemble the perfect insects.

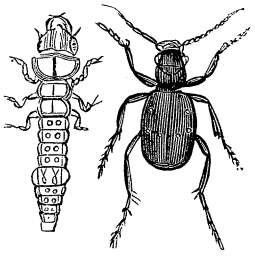
The insects of one family, the *Cicindelidæ*, which have received the name of *Tiger-Beetles*,

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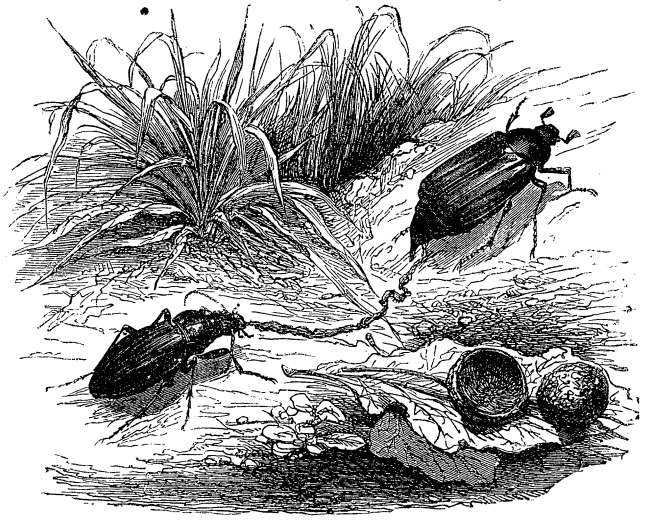


LARVA OF THE CICINDELA CAMPESTRIS SEIZING ITS PREY.

from their eminently predaceous propensities, are more diurnal in their habits than the rest of the tribe. They are usually green or gray, with a brassy or bronzed tint, with whitish or brindled spots or lines, giving them an elegant appearance. The common European species, *Cicindela campestris*, may be found flying and running about with great agility in the hottest sunshine. This insect is of a beautiful green color, with whitish spots; and its mouth is armed with a most formidable pair of sharp, toothed jaws. The larvæ are of a singular form; they live in holes in the ground, maintaining themselves by means of a pair of hooks placed on the enlarged eighth segment of their body, at such a height that their heads exactly occupy the mouth of the hole. Here they lie in wait for their prey, which consists of other larvæ, and the moment one of these approaches their den, they rush upon it with the greatest ferocity, and bear it off in their jaws.



CICINDELA CAMPESTRIS AND LARVA.



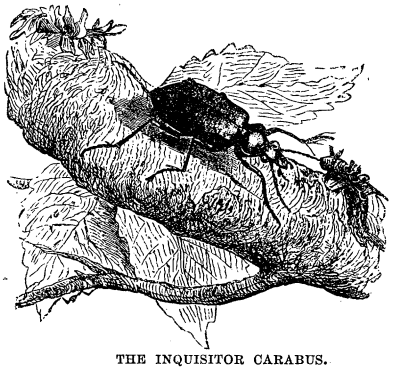
THE GOLDEN CARABUS AND THE COCK-CHAFER.

Numerous species of *Cicindela* are found in the United States. The Common Cicindel, *C. vulgaris*, is half an inch long, and appears in spring until June, and again in August. The Purple

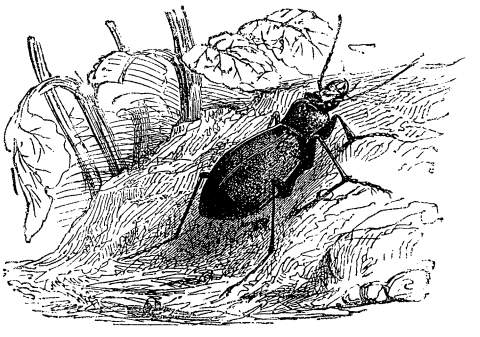
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Cicindel, *C. purpurea*, is purple and brilliant green: the Cousin Cicindel, *C. patruela*, is bottle-green above, steel-blue and green beneath; the White-lipped Cicindel, *C. albilabris*, is black, with a purplish tint above.

The genus *Carabus* includes numerous European species, some of which are brilliantly colored, and all of which are exceedingly rapacious—taking the place among insects of the lions and tigers among beasts. In illustration of the savageness of this race, the author of the "Jardin des Plantes" tells us of a Golden Carabus, *C. auratus*, that was seen to pursue and attack a cockchafer, and, having drawn out its bowels, proceed leisurely to devour them. This species inhabits gardens, and is popularly called the *Gardener*.



THE INQUISITOR CARABUS.



THE BLUE CARABUS.

The Blue Carabus, *C. cyaneus*, is an inch and a quarter long, the body oval, flat, and above of a brilliant blue. The Sycophant Carabus, *C. sycophanta*, is a beautiful species of a golden-green color, with coppery reflections: its larvæ are noted for the destruction they make among the processionary caterpillars. The Inquisitor Carabus, *C. inquisitor*, has the same form and manners as the preceding: the body is an inch long, and of a blackish-green color.



THE BOMBARDIER BEETLE.

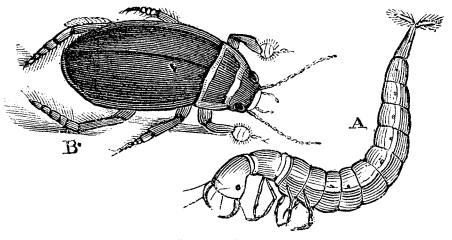
Another species, the Bombardier Beetle, *Aptinus balista*, are provided with a most extraordinary means of defense. These have a large oval abdomen, which secretes a caustic fluid. They live in societies, and when they are attacked or alarmed, they discharge this fluid, which not only makes a loud report, but diffuses a disagreeable and penetrating odor: if the liquid strikes the human skin, it produces a blister. The French call this battery of the little bombardiers an *Infernal Machine*—the name given to a terrible engine which was once exploded in the streets of Paris, designed to kill the Emperor Napoleon I. In tropical countries, this kind of insect is of

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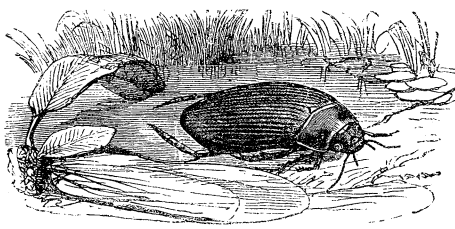
large size. An amusing French writer remarks that, if the common European species—there being several kinds—may be considered as provided with muskets, these seem, comparatively, to possess cannon.

THE HYDRADELPHAGA.

This term is from the Greek *hudor*, water, and *adelphagos*, voracious; the animals which it characterizes are pre-eminently carnivorous and rapacious in their habits. They have a somewhat flattened oval body, and the legs, especially the hinder pair, compressed and fringed with bristles, so as to become powerful paddles. Many of these insects are of considerable size, the *Dyticus marginalis*, a European species very common in ponds, attaining a length of more than an inch; while other species are much larger. The larva is of an elongated form, tapering toward the tail, which bears a pair of tubular ciliated appendages, which the creature applies to the surface of the water to obtain a supply of air for its respiration. It is as predaceous as its parent, seizing upon other aquatic larvæ with its long curved mandibles, and quickly sucking the juices out of the body of its victim. When about to change to the pupa state, the larva burrows into the bank of its native pond, and there undergoes its transformations.



DYTICUS MARGINALIS.
A, larva; B, perfect insect.



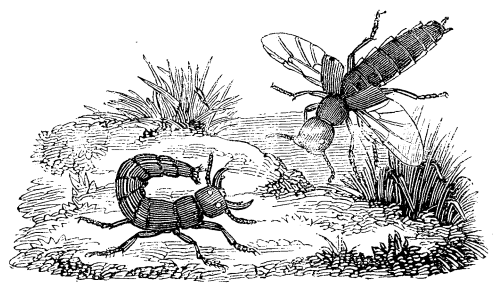
DYTICUS MARGINALIS, FEMALE

Harris's Dytice, *D. Harrisii*, one inch long, is common in ponds with a clear, sandy bottom, in this country.

The well-known *Gyrini*, or *Whirligigs*—little black beetles, which may be seen describing circles upon the surface of any piece of smooth water—are also placed in this tribe, although their claim to such position is rather doubtful. The European species, *Gyrinus natator*, is one fourth of an inch long, oval-shaped, of a blackish-brown color; this may serve as an example of the family.

THE BRACHELYTRA.

This term is from the Greek *brachus*, short, and *elytron*, a case, and refers to the shortness of the elytra, which leave a considerable portion of the abdomen of these insects uncovered. The wings, however, are usually ample, and the creatures fly well. They are generally of an elongated form, and the abdomen, which is horny on both surfaces, possesses great mobility. It assists in tucking the wings under the elytra after flight, and the insects generally raise it when alarmed or angry. This attitude has obtained for one European species, the *Goërius olens*, the appropriate name of *Cocktails*. The derivation of their other vulgar denomination, *Devil's Coach-Horses*, is not so clear. The larvæ are very similar to the perfect insects, both in appearance and habits. Many of them feed in carrion; others in rotten wood and other decaying vegetable matter. The number of joints in the tarsi varies greatly, but five is the prevalent number.



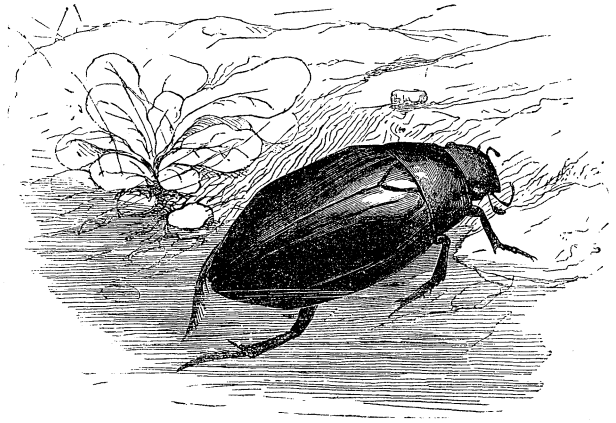
COCKTAILS.

THE PHILHYDRIDA.

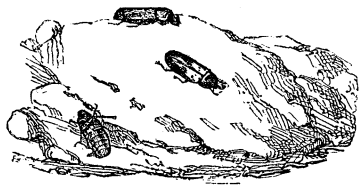
This term is from the Greek *phileo*, to love, and *hudor*, water, and is applied to this small tribe from their generally aquatic habits. Most of them live constantly in the water, and their legs are generally more or less flattened, to render them efficient as natatory organs. One of the

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largest European beetles, the Brown Hydrophile, *Hydroüs piceus*, which is common in ponds in some localities, belongs to this tribe. It also includes a group of small hemispherical beetles, the *Sphœridiidœ*, which constantly inhabit dung. The aquatic species are carnivorous in their habits, and the larger ones will often attack young frogs and fishes.



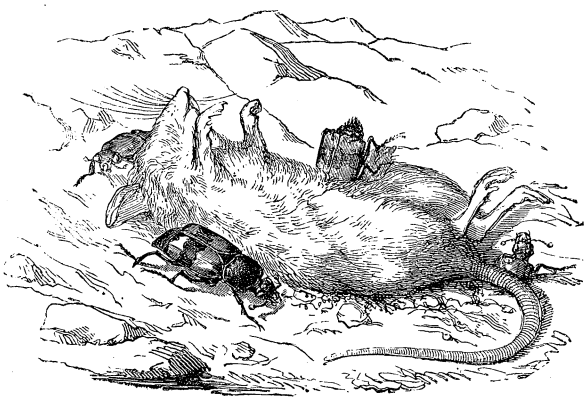
THE BROWN HYDROPHILE.



LARD-BEETLES.

THE NECROPHAGA.

This term is from the Greek *nekros*, the dead, and *phago*, to eat, and designates an immense number of small and moderate-sized insects, which live for the most part, both in the larva and perfect states, in decomposing animal and vegetable substances. A good many are also found under the bark of trees, and in fungi. The *Dermestidœ* are small beetles, clothed with minute hairs, which often do great damage to skins and furs, and other dry animal matter. The commonest species, the Lard-Beetle, *Dermestes lardarius*, has received its specific name on account of the fondness exhibited by its curious larva for bacon.



BURYING BEETLES.



THE NECROPHORUS GERMANICUS.

The largest and most interesting insects belonging to this tribe are those of the family *Silphidœ*, which includes the *Burying* or *Sexton Beetles*—*Necrophori*—and their allies. The Burying Beetles are prompted by their instinct to bury any small animals or pieces of carrion as a provision for their young. In many cases several of them set to work together, getting under the animal to be buried, and digging the earth out with their feet. In this way they will quickly bury animals many times their size, such as mice and small birds. In the excavations they have made, they lay their eggs. When they have departed, these are frequently occupied by a larger species, the *Necrophorus Germanicus*.

This family of insects are common in Europe and America. They run and fly well, and some of them are adorned with bright orange-colored bands; but they diffuse a most abominable odor, arising probably from the nature

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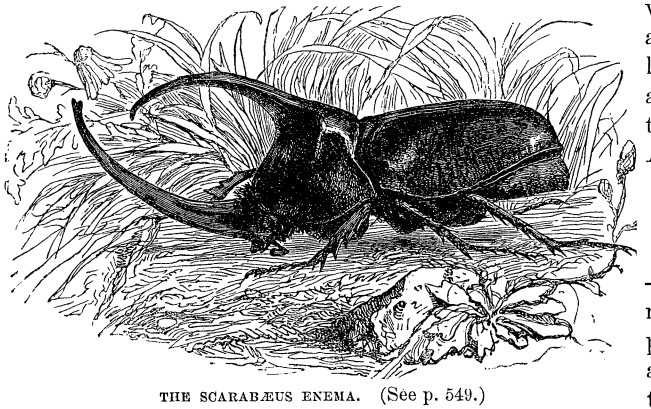
of their food. Several species are found in the United States: the American Undertaker, *N. Americanus*, is an inch and a quarter long, and is generally of a shiny-black color. The *N. tomentosus* is nearly an inch long, and is quite hairy; common in July in New England and New York.

THE HELOCERA.

The *Helocera* are distinguished by their flattened contractile limbs, each portion of which folds closely upon its neighbor, the whole, when thus reduced to the smallest compass, being received in cavities of the lower surface of the body. This position is always assumed by these beetles when alarmed, and from this assumption of a death-like attitude, some of the commonest species have received the name of *Mimic Beetles*. These insects, both in the larva and perfect states, are commonly found in cow-dung; a few also inhabit rotten wood; some are to be met with under the bark of trees, and a few in carrion. This tribe includes two groups—the *Histeridæ*, smallish insects, generally of a black color, with the elytra rather shorter than the body, which is usually of a square form; and the *Byrrhidæ*, with elytra as long as the abdomen. The latter are of a round or oval form, whence they have received the name of *Pill-Beetles*.



THE FOUR-SPOTTED BEETLE: HISTER QUADRIMACULATUS.



THE SCARABÆUS ENEMA. (See p. 549.)



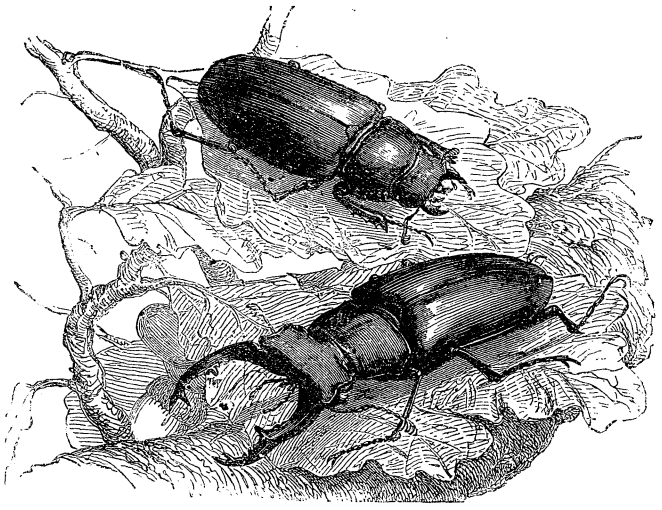
THE COCK-CHAFER.

THE LAMELLICORNIA.

The tribe of *Lamellicorn Beetles* — *Lamellicornia* — deriving their name from the Latin *lamella*, a plate, and *cornu*, a horn, are characterized by having the antennæ terminated by a club, composed of several leaf-like joints, laid together like the leaves of a book. This tribe includes an immense number of species, some of which are among the largest and most splendid of insects. In the European Stag-Beetle, *Lucanus cervus*, as well as the *L. dama* of our country, called *Horn Beetle*, the leaves are short and distinct, rendering the club pectinated. In the common European Cock-Chafer, *Melolontha vulgaris*, they are of considerable length, especially in the male, and fold up like the leaves of a fan. These insects fly well, but heavily, with a loud whirring noise; but they generally crawl slowly. The larvæ are thick fleshy grubs, furnished with a distinct head, and with six jointed feet, and have the hinder part bent down. They live in very various situations,

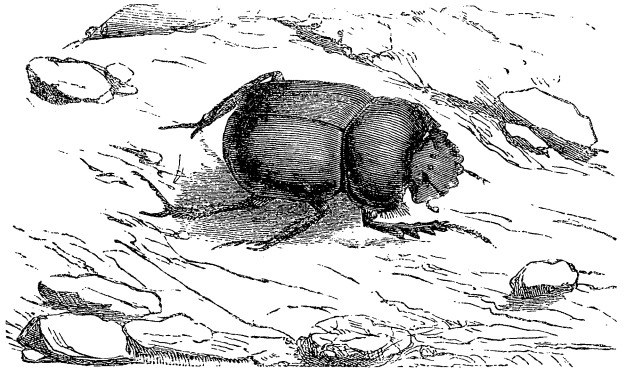
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in dung, in decaying vegetable matter, and in the earth, feeding upon roots. They usually pass several years in the larva state, and change to the pupa in the interior of a sort of cocoon, formed of particles of the surrounding materials, agglutinated together by a sticky secretion.

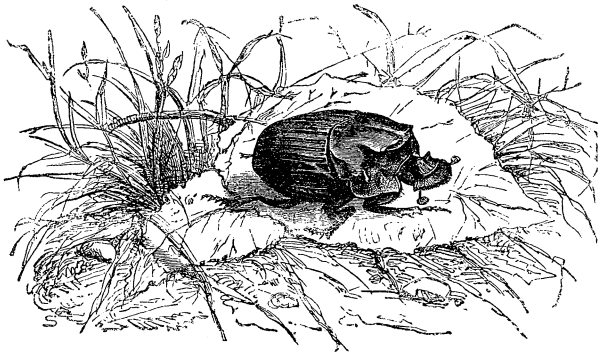


THE STAG BEETLE.

Many of the perfect insects of this family are found in the same situations as their larvæ, especially in the case of the dung-feeding species. Of those which live in rotten wood, many, like the Rose-Chafer, or Rose-Bug, or Cherry-Bug, *Macrodactylus sub-spinosus* of our own country, and its still more splendid foreign allies, frequent flowers in their perfect state; and the common Cock-Chafer, the larva of which feeds upon and often does great mischief to the roots of plants, lives entirely upon leaves after it has undergone its last change.



THE SACRED BEETLE.



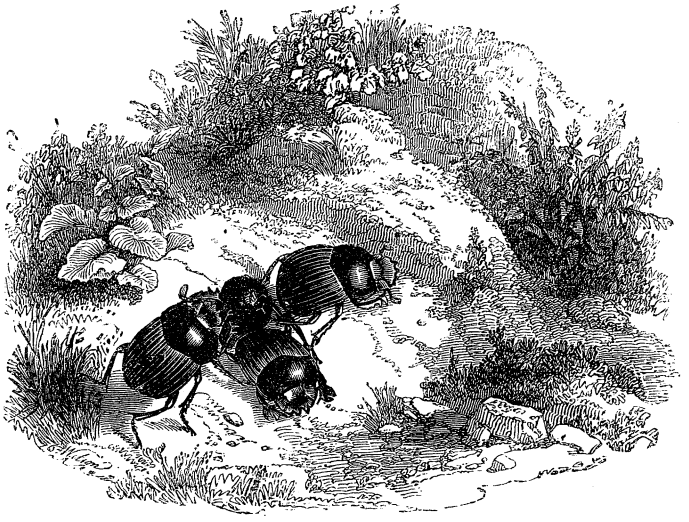
THE MIMAS.

Besides the species of Cock-Chafer above mentioned, is the *Melolontha fullo*, the largest of the European kinds, being over an inch long; the body black, and spotted with white.

Many of the dung-beetles, among which the Sacred Beetle of the Egyptians, *Scarabæus Ægyptiorum*, holds a prominent place, are remarkable for inclosing their eggs in a small pellet of dung, which they then roll along with their hind-legs, until they drop it into a hole which they have dug for its reception. There is a similar species in this country, the *S. pilularius*, familiarly called *Tumble-Bug*. The Mimas, *S. mimas*, is a beautiful South American species, of a rich golden-green color.

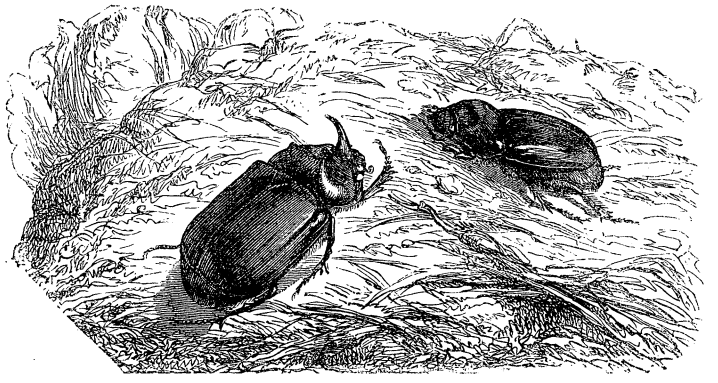
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Other species, like the common *Geotrupidæ* and *Aphodiidæ*, frequently met with in Europe, are contented with depositing their eggs in the midst of a plentiful supply of food.



TUMBLE-BUGS.

The forms of some of the Lamellicorn insects are extremely curious, and many of the larger tropical species are furnished with enormous horns on the head and thorax, which give them a singular appearance. The *Hercules Beetle—Dynastes Hercules*—is one of the most remarkable of these. It is a native of Brazil, sometimes attaining a length of five inches. (See p. 542.) The *Scarabæus Enema*, however, of the East Indies, is nearly twice as long, its color being of a brilliant brown. The *S. nasicornis* is a European species, common in gardens, and is noted for a pair of curious conical horns upon its head.

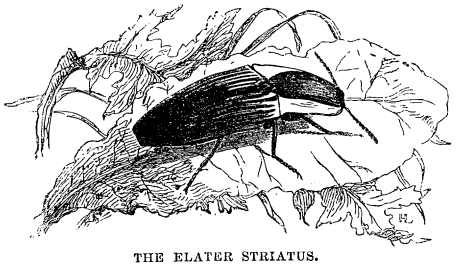


THE SCARABÆUS NASICORNIS.

The *Passalus interruptus* of Linnæus is a large species of beetle, nearly two inches long, of a shiny-black color, the larva feeding on roots, and the insect being met with in the trunks of trees and on sugar-canes. It is common in the West Indies. (See p. 541.) Other species of Passalus are found in New Holland, India, and South America.

THE STERNOXIA.

In the *Sternoxia*—a term meaning *sharp-breasted*—the prosternum is produced in front into a lobe, and behind into a spine, which is received in a small cavity of the mesosternum. By the assistance of this apparatus—the spine being drawn out of its groove and then suddenly brought into it again—many of these insects, as the *Elateridæ*, are enabled to execute considerable springs, when laid upon their backs, and are hence called *Spring Beetles* or *Snapping Bugs*. The larvæ of some species are wood-borers; those of others live in rotten wood; and some inhabit the ground, feeding upon the roots of plants. One of the latter, well known to agriculturists, is the *Wire-Worm*, often producing great destruction of the crops of Indian corn, grass, and all cereals. The *Elater striatus*, of Cayenne, is an inch long, of a black color, and striped upon the back.

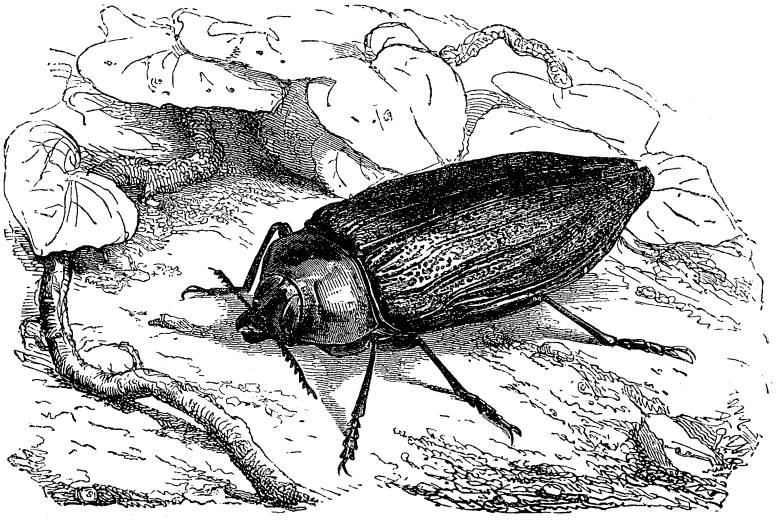


THE ELATER STRIATUS.

Some of these insects are luminous in the dark. These, including half a dozen species, and arranged by Emmons under the genus *Lampyris*, are the *Fire-Flies*, or *Lightning-Bugs*,

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which produce such a beautiful effect at night, during the close of summer and beginning of autumn, in our country, and which are still more brilliant in tropical regions. The *E. noctilucus*, of South America and the West Indies, is over an inch long, of a brown color, and is so luminous that several of that species being put into a glass jar or bottle, give light enough to read by. The light is emitted from two large oval spots on the thorax. Other species of this family are remarkable for the metallic splendor of their colors; of these, the *Buprestidæ*, very few are found in Europe; but the American species are numerous, and often attain a large size.



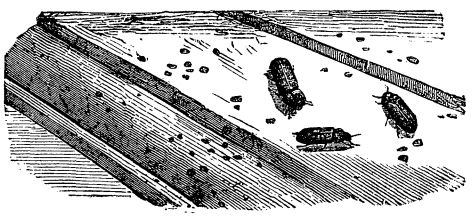
THE GIANT BUPRESTIS.

The GIANT BUPRESTIS, *B. gigantea* of Guiana, is two inches long, and its body is of a green coppery color. It is so brilliant that the inhabitants make bracelets and other ornaments of it. The *B. fasciata*, of our country, is of a fine green color, and over half an inch long.

THE MALACODERMATA.

This term is from the Greek *malakos*, soft, and *derma*, skin, and is descriptive of most of the species. These are distinguished from the Sternoxia, by having the prosternum of the ordinary form, and not produced into a spine, posteriorly. Many of these, such as the European species familiarly called *Soldiers* and *Sailors*—*Telephori*—are predaceous in their habits, while others are wood-borers, and some feed on dry animal substances. Of the wood-boring species, one, the *Lymexylon navale*, infests oak timber, to which it frequently does incredible mischief in dock-yards.

Other species, which also bore into timber in their larva state, are well known by the name of *Death-Watch*—*Anobium*—from their habit of making a ticking noise by knocking with their jaws against the wood-work upon which they are standing, this being the call of the insect to its mate. They are little creatures, which often do great damage to furniture in houses. When touched they contract their legs and counterfeit death—a piece of mimicry they are said to keep up even when exposed to a heat sufficient to roast them. Another insect, the *Atropos pulsatorius*, which we shall hereafter notice, is also called Death-Watch.

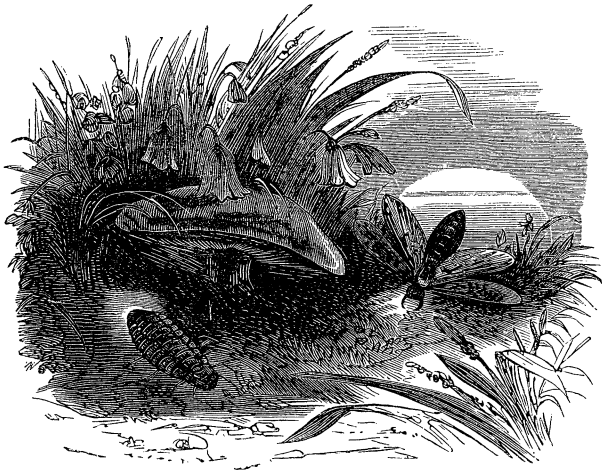


DEATH-WATCHES.

To this group also belongs the EUROPEAN GLOW-WORM, *Lampyris noctiluca*, whose lamp has so often been the theme of the poet's song. The female is chiefly luminous. It is a flat,

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grayish-brown creature, rather more than half an inch long, and quite destitute of wings. The male, on the contrary, is active, and flies well; and the luminosity of the female appears to be intended to attract her volatile companion. The light proceeds from the under part of the abdomen and near the tip, and the animal appears to have the power of varying its intensity. If this luminous portion be removed, it retains its illuminating property for some time. If the glow-worm be immersed in warm water, it emits a brilliant light; if placed in cold water, its light is extinguished.



THE GLOW-WORM.

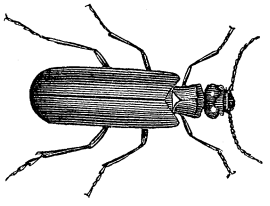
The larvæ of some species of the genus *Clerus* live parasitically in the nests of bees and wasps, feeding upon their larvæ.

THE HETEROMERA.

This term is from the Greek *heteros*, dissimilar, and *mera*, divisions; it includes several genera, the spines having four joints in the posterior tarsi, and five in the other four feet.

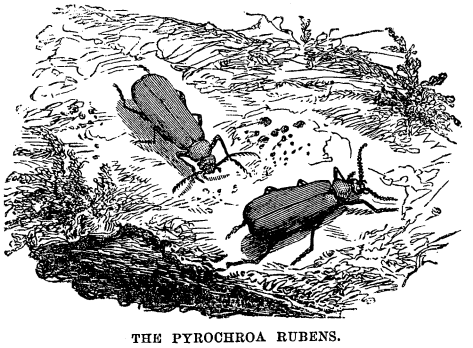
THE TRACHELIA.

The *Trachelia* are generally active diurnal insects, frequently adorned with gay colors. Their bodies are often soft, the elytra flexible, and sometimes much shorter than the abdomen. To this tribe belongs the Blister or Spanish Fly, *Lytta vesicatoria*, the important medicinal uses of which, under the name of *Cantharides*, are so well known. These insects are common in the south of Europe, and are especially abundant in Spain, where they are taken in large numbers, and from which source the best are generally obtained. They feed principally upon the ash.



THE SPANISH FLY.

Many other insects belonging to this tribe, also contain a substance which has the effect of raising blisters when applied to the skin; and these are employed in their native countries in place of the *Lytta vesicatoria*. The species of *Meloe*, several of which are found in Great Britain, possess this property; which, however, seems in all cases to increase in intensity in proportion to the heat of the country in which the insects live.



THE PYROCHROA RUBENS.

The species of *Meloe* are soft, sluggish beetles, with short elytra and no wings, and may be found crawling about among the grass, in warm, sandy places in the early summer. The young larvæ, on first leaving the egg, attach themselves to wild bees, and it is supposed that they are afterward parasitic upon the bee larvæ. In this country the *Epicauta vittata*, often called the *Potato Fly*, as well as other species, have the power of raising blisters and may be used for this purpose.

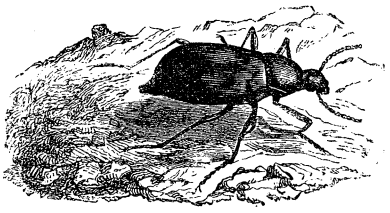
The curious *Ripiphorus paradoxus*—a small beetle, also belonging to this group—is parasitic in the nests of the common wasp; and many other species appear to be parasitic in their larva state. One of the most beautiful of the Euro-

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pean species is the *Pyrochroa rubens*, which is found about hedge-banks. A similar species, *P. flabellata*, is common in this country. In the *Salpingidæ*, the front of the head is produced into a short snout.

THE ATRACHELIA.

These are generally black, or of dull colors, nocturnal in their habits, and slow in their motions, usually crawling upon the ground in obscure situations. A few are found upon trees and plants, and these, in their structure, evidently approach the preceding tribe. A European example of this group is furnished by the common *Blaps mortisaga*, which bears the English name of Churchyard Beetle. These insects are generally found in dark and dirty places about houses, in cellars, and similar situations. In Europe the meeting of this insect in a house is considered a prestige of death. Another species is the *Tenebrio molitor*, common in Europe and this country, of which the larva, found in flour, meal, etc., is well known as the *Meal-Worm*. It is common in mills, meal-tubs, granaries, and is destructive to sea-biscuit on shipboard. Multitudes are raised in Europe to feed nightingales and other cage-birds. Other species of *Tenebrio* live under the bark of trees, and in decaying vegetable matter; but comparatively few are found in this country.



THE CHURCHYARD BEETLE.



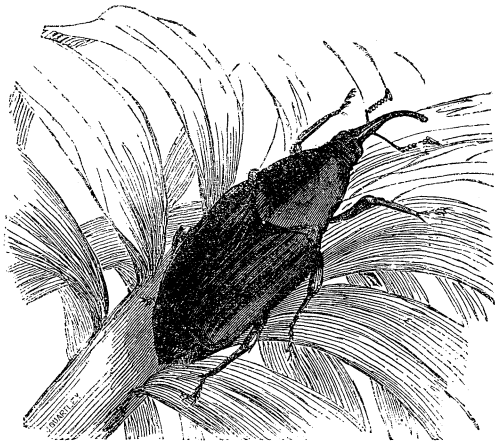
THE TENEBRIO MOLITOR.

THE TETRAMERA.

This term, derived from the Greek *tetra*, four, and *mera*, divisions, includes a great number of beetles, which have only four apparent joints in all the tarsi; they rarely attain great size, and many are very minute; the colors are often brilliant and beautiful.

THE RHYNCHOPHORA.

This term, from the Greek *rhynchos*, a snout, and *phero*, to bear, are distinguished by having the front of the head produced into a snout or rostrum, at the extremity of which the mouth is situated. The larvæ are soft, footless grubs, which usually live in the interior of the stems, fruits, and seeds of plants, to which their ravages are often very injurious. Among these the Corn-Weevil, *Calandra granaria*, a European species, introduced into and spread over this country, holds the most conspicuous place, as its larva frequently causes great damage in granaries. One of the commonest European species is the Nut-Weevil, *Balaninus nucum*, the parent of the little white grubs so frequently met with in filberts and other nuts. This insect has a very long rostrum, and by means of this, the female is said to eat a small hole in the young nut while its integuments are still soft. Here she deposits an egg, and the larva when hatched eats its way into the interior of the kernel, where it continues to reside until it has arrived at maturity. It then eats its way out of the nut, and falls to the ground, into which it burrows, and there undergoes its transformation to the pupa state, which, however, does not take place until the commencement of the second summer. The history of the other species of the tribe appears to be very similar, although many pass to the pupa



THE PALM-WEEVIL.

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state attached to or inclosed within the substance upon which they have been feeding in the larva state.

Analogous American species are the *Balaninus rectus*, which attacks and destroys the nut of the chinquapin or dwarf-chestnut; the PLUM-WEEVIL, *Rhynchænus nenuphar*, which deposits its eggs in many fruits, as plums, cherries, apples, quinces, &c., and is suspected of inserting its eggs in the tender limbs of cherries and plums, thus causing the black excrescences which often disfigure them.

The PALM-WEEVIL—*Curculio palmarum* of Linnæus—found in South America, is a very large species, nearly two inches long; it is black, and lives on the sago-palm.

Most of the Rhynchophora are more or less covered with minute scales, somewhat resembling those with which the wings of the *Lepidoptera* are clothed, and these, in many cases, exhibit a splendor of color scarcely, if at all, inferior to that of the most gorgeous of butterflies. Even among the small species several of great beauty are to be met with, and few insects can boast of greater magnificence than the well-known DIAMOND-BEETLE of Brazil, *Curculio imperialis*.

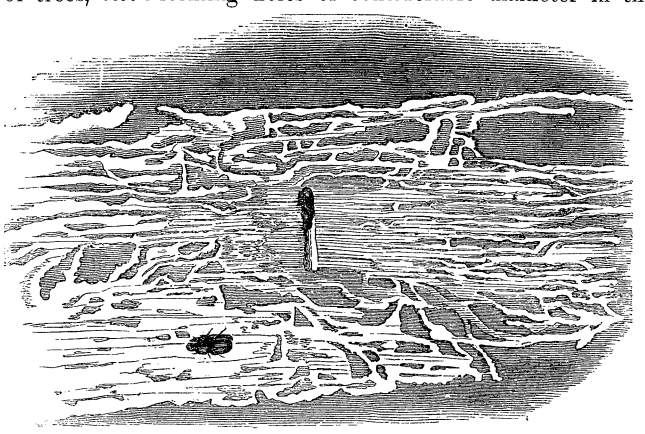


THE DIAMOND-BEETLE.

The insects just referred to all possess geniculated antennæ, but the habits of those with straight antennæ differ but little from those of their allies. One of the best known is the *Bruchus pisi*, the larva of which is very common in the seeds of the pea, and to such an extent does this insect abound in some localities that it has sometimes occasioned the entire destruction of the pea-crops. It is common both in Europe and America, being here called the *Pea-bug*. Another species, *Rhynchite Bacchus*, attacks the buds and leaves of the vine, to which it often does immense injury in the wine countries of Europe.

THE XYLOPHAGA.

A considerable number of the true Rhynchophora burrow in their larva state into the stems of trees, often forming holes of considerable diameter in the solid wood. They are, however, completely outdone in this respect by the insects of a subtribe which have received the name of *Xylophaga*, or *Wood-Eaters*, from their constant habit, both in the larva and perfect states, of boring into the solid wood of trees. In their general structure they resemble the Rhynchophora, but their heads are broad and flat, not distinctly rostrated, and the antennæ are inserted beneath the lateral margins of the head. Although they are of small size, the damage which they occasion in forests is often enormous. The *Scolytus destructor*, a common British species, destroys great numbers of elm-trees, and the *Scolytus pyri*, or PEAR-BLIGHT BEETLE, of this country, does great damage to pear-trees, the larva entering and piercing the limbs at the roots of the buds. The ravages of some other species are



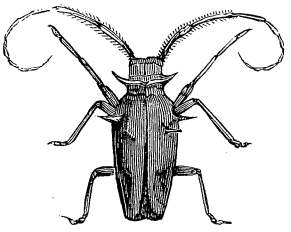
THE TYPOGRAPHIC BEETLE.

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almost incredible. Of these are the *Tomicus typographus* and the *Hylurgus piniperda*. The former receives its name of the TYPOGRAPHIC BEETLE, from the circumstance that the burrows formed by it in feeding upon the soft wood, immediately within the bark, often present a rude resemblance to printed characters. The devastations of these apparently contemptible foes are sometimes so formidable in the pine-forests of Germany, that prayers for their restriction are offered up in the churches; we are told that in the year 1783 at least a million and a half of trees were destroyed by these insects in the Hartz forest alone. The *Tomicus pini* infests the white-pine of this country, and the *T. liminaris* is suspected of producing the yellows in peach-trees. Both of these insects are exceedingly minute, being about one-sixth of an inch long.

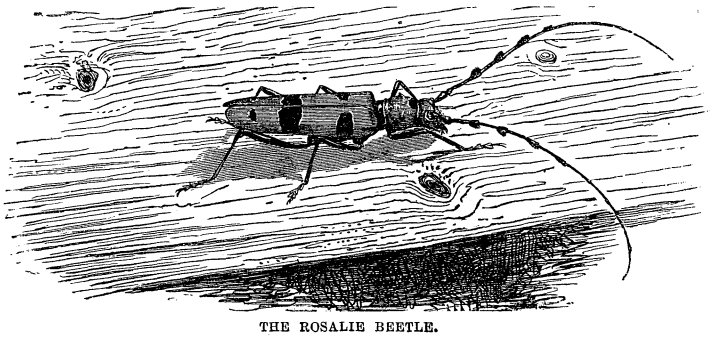
THE LONGICORNIA.

The insects of this tribe, called *Capricorn Beetles*, and distributed throughout most parts of the world, are generally distinguished by the great length of their antennæ, these being usually considerably longer than the body. Most of these are large and elegant, often adorned with splendid colors, or armed with spines upon the thorax and other parts of the body, which sometimes render their appearance curious and even grotesque. The *Cerambyx Alpinus*, of Linnæus, common in the Alps and in France, where it is called ROSALIE, is of an ashy-blue color, and is a very elegant species. One of the handsomest British beetles is the *Callichroma moschata*, belonging to this tribe. It is also distinguished by its peculiar musky odor. It is of a fine metallic-green color; but many exotic insects nearly allied to this, are far more splendid in appearance.



CAPRICORN BEETLE.

The larvæ of some of these insects live in timber, often doing enormous injury to trees by eating large passages through the solid wood. They are soft, fleshy grubs, generally widened in front, and almost destitute of feet. They appear to live in this condition for several years, and afterward probably pass a considerable time in the pupa state, as the perfect insects have been known to eat their way out of timber which had been for some time worked up into furniture. They have been carried from one country to another in timber, and have thus become widely dispersed. These beetles generally produce a sharp, grating sound, by the friction of the back of the prothorax upon the base of the scutellum.



THE ROSALIE BEETLE.

There are several noted species analogous to the preceding. Among them is the *Leptura mordax* of Europe, three-fourths of an inch long, which bites severely when captured with the hand. The *Clytus campestris*, of this country, is injurious to fallen chestnut timber, damaging it for rails. The larva of the *Saperda candida*, called *Apple-tree Borer*, penetrates the young apple-trees just above or below the surface, then cutting its way in a winding manner upward, thus often proving destructive. The *S. tripunctata*, called the *Raspberry Saperda*, does mischief to the raspberry and blackberry bushes, by laying its eggs in their stems; the grubs burrow in the pith, and destroy them.

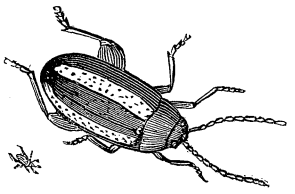


THE LEPTURA MORDAX.

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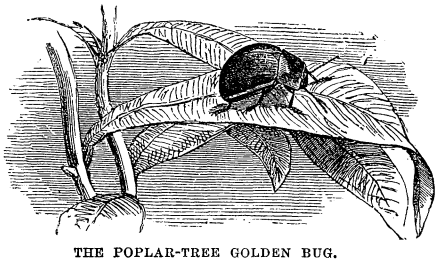
THE PHYTOPHAGA.

This term is derived from the Greek *phytos*, a plant, and *phago*, to eat. These insects rarely attain any great size, and many of them are very minute; their colors, however, especially in the larger exotic species, are often very splendid, in some cases, perhaps, exceeding in brilliancy those of any other beetles. They feed upon plants both in the larva and the perfect state, and many of them do great damage to crops. The EUROPEAN TURNIP-FLY, *Haltica nemorum*, one of the most destructive species, belongs to a group in which the posterior thighs are much thickened for jumping.



THE TURNIP-FLY MAGNIFIED.

Among the American species, here called *Leapers*, are the *H. chalybea*, infesting grape-vines: the *H. cucumeris*, found on cucumber-vines, and the *H. striolata*, feeding on the horse-radish, mustard, and turnip.

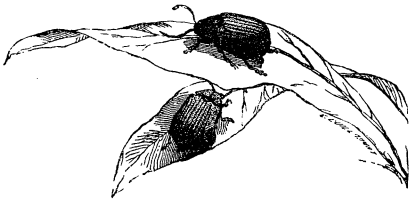


THE POPLAR-TREE GOLDEN BUG.



THE CASSIDA GIBBOSA.

The most singular insects belonging to this tribe are the *Cassididæ*, or HELMET-BEETLES, in which the body is rather flat, margined all round with dilatations of the thorax and elytra. The dilated portion of the former completely conceals even the head. They are slow-moving animals, which always draw up their limbs and mimic death when disturbed. Their larvæ are furnished with a caudal fork, projecting forward over the back. Upon this they collect their excrement, which thus forms a portable shelter. The *Cassida gibbosa* of Brazil, three-quarters of an inch long, is one of the larger species. The TORTOISE-BEETLE, *Cassida clavata*, is nearly one-fourth of an inch long, and a few years ago ravaged the locust-trees in Western Pennsylvania.



THE GARDEN LOUSE.

The *Galeruca rustica* is a common European species, called *Garden Louse;* the *G. vittata*, found in this country, is called the *Cap Beetle*. The POPLAR-TREE GOLDEN BUG, *Chrysomela populi*, of a bluish-green, has a strong odor, and on being touched discharges a yellow liquid: found in Central Europe.

THE TRIMERA.

This term is from the Greek *treis*, three, and *mera*, divisions, and includes a single tribe, distinguished by having, apparently, only three joints in the tarsi, though, in fact, a small joint exists at the base of the last joint. Some naturalists call them *Pseudo-trimera*.



THE LADY-BIRD.

THE COCCINELLIDÆ.

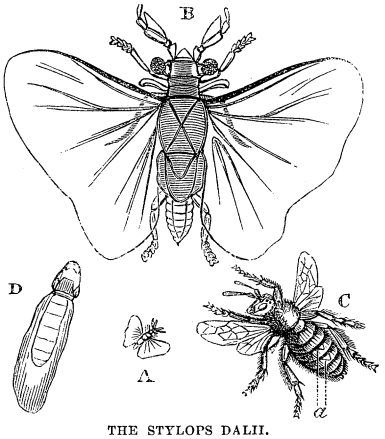
A well known example of this family in this country as well as in other parts of the world, is the LADY-BIRD, of which there are several species, the largest being the common European species, the *Coccinella septempunctata*, or SEVEN-SPOTTED LADY-BIRD. In France these insects are called *Vaches à Dieu* and *Bêtes du bon Dieu*—that is, *Cows of the Lord*, and *Insects of the Lord*. The numerous species of *Coccinellæ* feed upon *Aphides*, or *Plant Lice*, both in the larva and perfect states, and are often seen on fruit-trees, as the pear, peach, and plum, and on rose-bushes and

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other shrubs. The larvæ are of a slate color, with yellow tubercles and spots, and furnished with six well-developed legs. They attach themselves by the tail before changing to the pupa state. The colors of the perfect insects run from red or yellow, with or without black spots, to black, with or without red or yellow spots; and as all this variety of color may occur in individuals of the same kind, the determination of the species in this group is excessively difficult. When touched or disturbed, the lady-birds draw their legs close up to the body, emitting at the same time a yellow and somewhat acrid fluid, which, according to some writers, is a specific for the toothache. These beautiful creatures are useful to the gardener and farmer, by devouring many of the aphides which infest trees and plants.

ORDER 2. STREPSIPTERA.

This name is from the Greek *strepsis*, a turning, and *ptera*, wings, and is applied to a small order of minute insects which are parasitic in the interior of numerous species of bees and wasps. The males have a single pair of large, membraneous, folded wings; the females appear like soft maggots, furnished with a horny head, which they protrude between the segments of the bee in which they are parasitic, the remainder of the body remaining concealed. The female never quits the body of the bee; the larvæ are hatched within the body of their mother, from which they escape into the open air. In their earliest state they are active, little, six-footed creatures. They attach themselves to the bodies of bees and wasps, by which they are conveyed into their nest. Here they bury themselves in the body of the bee or wasp larva, and become converted into soft, maggot-like grubs, which continue to feed upon the substance of their victim until the latter arrives at its perfect state. The only further change which the female undergoes consists in the hardening of the head and the development of the generative organs. The male, however, becomes converted into a pupa within the skin of the larva, the head of which also becomes horny, and protrudes like that of the female from between the rings of the bee. When the male is ready to emerge, this horny piece is thrown off like a lid, and the perfect insect quits his former residence. During their existence in this state, which is probably very short, the males are very active, flying about in the sunshine with a buzzing noise. The antennæ often exhibit very singular forms, being sometimes forked or branched, and sometimes pectinated. The eyes are generally very prominent; they consist of but few facets, and these are separated from each other by raised partitions, which give a curious cellular appearance to their surface. An example of this order is furnished in the European species, *Stylops Dalii*.



THE STYLOPS DALII.

A, male, natural size; B, the same, magnified; C, Bee, with head of female; *a*, Stylops, projecting from between the abdominal rings; D, female, magnified.

ORDER 3. HYMENOPTERA.

This name is derived from the Greek *hymen*, a membrane, and *ptera*, wings, and is descriptive of one characteristic of the order, from which these have been called *Membraneous-winged Insects*. It includes a vast number of familiar but interesting species, probably including one-fourth of the entire insect world. Their wings, when present, are four in number, naked, transparent, and of a membraneous texture. The mouth is always furnished with a pair of strong mandibles, and in most cases with maxillæ and other organs of the usual form. The eyes are generally large, and the ocelli usually three in number. The body, the three great divisions of which are usually very distinct, is covered with scaly armor. These insects are distinguished by an ovipositor in the female, which not only serves for placing the eggs, but in some species, as the bees, wasps, hornets, &c., constitutes a most formidable offensive weapon. The larvæ of most species are footless grubs; the pupæ are generally quiescent, being completely enveloped

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in a delicate skin, and each limb separately inclosed. The order is divided into two groups, the *Petiolata* and the *Securifera*.

THE PETIOLATA.

These are distinguished by the maggot-like form of their larvæ, and the union of the abdomen with the thorax by the intervention of a slender footstalk. They comprise several very interesting tribes.

THE ANTHOPHILA.

This tribe, as the name imports, consists of the *Flower-Lovers;* by some authors they are called *Mellifera*, or *Honey-Bearers*: all, however, pass under the popular designation of Bees. The different species of these amount to many hundreds, probably to thousands; in England alone there are two hundred and fifty species. We can only mention a few of the more remarkable.



THE HONEY-BEE.

We begin with the Honey-Bee, *Apis mellifica* of Linnæus, to which we are indebted for honey and wax, and which from the earliest ages, has excited the admiration of mankind by its industry, and its wonderful instincts. The extent of its utility may be inferred from the fact that in 1850, no less than fifteen millions of pounds of honey and wax were gathered from bees in the United States, alone. The quantity annually obtained throughout the world amounts to hundreds of millions. The amazing endowments of these minute creatures will be best understood by a recital of their habits and economy. They are said to have originated in Greece, but have since spread all over the world; they live in colonies composed of from ten to thirty thousand neuter or *Working Bees*, of from six to eight hundred males called *Drones*, and of a single female, which seems to reign as *Queen*. They establish their dwellings in the trunk of some ancient tree, or in the hive which man prepares for them, and to the working bees belong the labors to which the society owes its existence. Of these, some are the *wax-gatherers*, which go abroad to collect the food and the materials for the construction of the comb; to others, called *nurses*, is assigned the task of watching over the young.

The working bee, for collecting the wax, enters a flower, the stamens of which are loaded with pollen. This dust attaches itself to the brush-like hairs covering the body of the bee, when, by rubbing itself with the brushes with which the tarsi are furnished, the insect collects it into little parcels, which it places on small palettes, hollowed out on the surface of its hind limbs. By the aid of mandibles the working bees detach from the surface of plants a resinous matter called *propolis*, and with it they

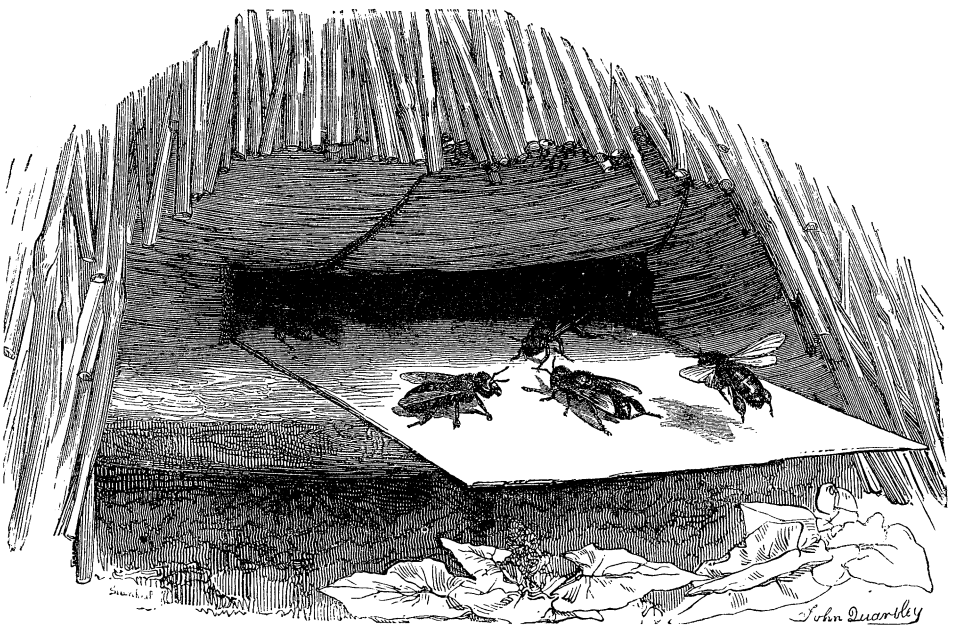


THE QUEEN BEE, MAGNIFIED.



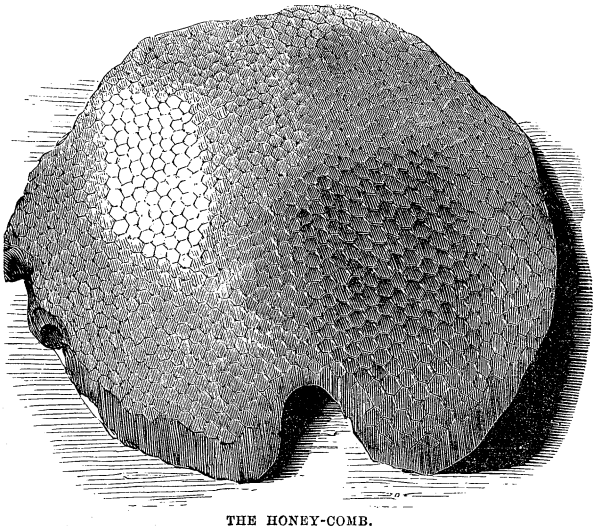
THE DRONE, MAGNIFIED.

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WORKING BEES.

also fill their little baskets. Thus loaded the bees return to deposit in the interior of the hive, the materials collected, which being done, they set out again in quest of more. The labor in the interior of the hive is more complex. They begin by closing with the propolis every fissure in the habitation, leaving but one opening of no great dimensions. They next proceed to the formation of the comb intended to lodge the young, and to serve as store-cells for the provisions of the community. The comb is made of wax, found in various plants, but which is also secreted by the bees themselves in organs situated under the abdominal base, and suspended perpendicularly by one of their sides. Empty spaces are left between them to permit of the bees reaching every part. The cells are arranged horizontally, and are open at one of their extremities; they are all of nearly the same dimensions, but some few, called *royal*, are much larger than the others, almost cylindrical, and destined to contain the female larvæ.



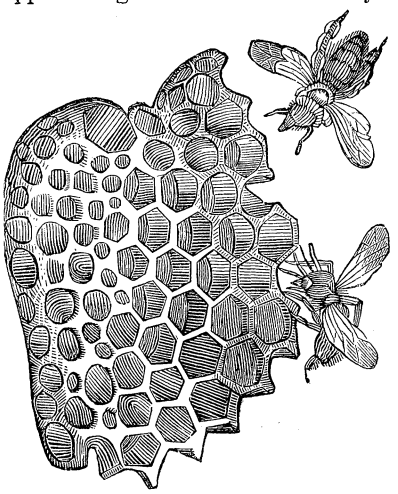
THE HONEY-COMB.

Bees inclose with a covering of wax the cells containing the honey, and they take means to strengthen the combs when any accident threatens their safety. The males do not share in these labors, and when they are no longer of any use to the community, the working bees sting them to death. This carnage takes place between June and August, and it extends even to the male larvæ and nymphæ.

The female does no work; she is always pampered and attended to with the utmost care by the rest of the hive. She is larger and longer than the other bees; she moves in a slow and

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majestic manner, and is always accompanied by a guard of twelve workers, an office taken in turn, and never intermitted. The guards clear the way for the queen, and display the utmost veneration toward her. From the time she begins to lay eggs, she becomes for the whole colony an object of the utmost respect, and she permits no rival in the hive. Should one accidentally appear, a mortal combat ensues, which terminates fatally for one, the other remaining sovereign of the hive. So long as she is shut up in her habitation, she lays no eggs; but should fine weather appear, she leaves the cell and the hive a few days after her birth, and ascends in the air out of sight, with the males. But she soon returns to the hive, and commences laying eggs forty-six hours afterward. These eggs she deposits in cells already prepared for their use. During the first summer, these eggs are not numerous, and they become merely working bees. During winter she ceases to lay eggs, but so soon as spring-time returns, her fecundity becomes extreme, and in three weeks she lays more than twelve thousand eggs. Toward the eleventh month of her existence she begins to lay eggs which produce the DRONES, or males, along with others which belong to the working class; those of the females come a little later. In three or four days after the laying, the eggs are fully hatched, and there comes forth a little larva of a whitish color, which, having no feet, is helpless; but the working bees provide amply for it, and furnish it with a sort of *bouillie*, of which the qualities vary with the age and sex of the individual for which it is intended; and at the moment of the transformation of the larva into a nymph, they shut it into its cell, closing it in with a covering of wax. Five days after the birth of the larva of a working bee, its nurses inclose it thus in its cell. It now spins around its body a web of silk, and at the end of three days changes into a nymph. Finally, after having remained under this form during seven days and a half, it undergoes its last metamorphosis. The males do not attain their perfect state before the twenty-first day from the birth of the larva, while the females undergo their last metamorphosis on the thirteenth day. By varying the food given to the larvæ, the working bees, or nurses, can change them from working bees, or neuters, into females or queens. Should the queen bee be lost, the working bees immediately set to work and break down several ordinary cells to convert them into a royal cell. The larva of one of these cells is now fed so as to become a queen bee. When a young queen bee has finished her metamorphosis, and gnawed through the covering of the cell, a great agitation may be observed in the hive. On one side may be seen working bees, which strive, as it were, to retain her in the royal cell by shutting up all access to it; on the other hand may be seen the old queen bee approaching to endeavor to destroy her, in which attempt she is obstructed by hosts of working bees, which endeavor to arrest her progress, but make no attack on her. At last, as if in a passion, she quits the hive, and with her the greater part of the working bees and males over whom she presided. The young bees, too feeble to leave, remain with the young queen bee, which now becomes the sovereign of a new colony, occupying the seat of the original one. The hive which has left with the old queen remain together, and form a new society, which, recommencing again all the labors we have just described, furnishes, after a certain time, a second swarm, whose emigration is determined by the same causes as those which give rise to the first. A hive gives off several swarms during a season, but the last are always feeble. The colony sometimes breaks up on the death of the queen bee, the attacks of enemies, or the weakness of the swarm; but the bees thus dispersed seek shelter in other hives, where they are uniformly destroyed by the proprietors of the hive, for no strange bee is admitted into a hive in which it was not born. Sometimes, also, a whole colony attacks another, and robs it of its stores of provisions.



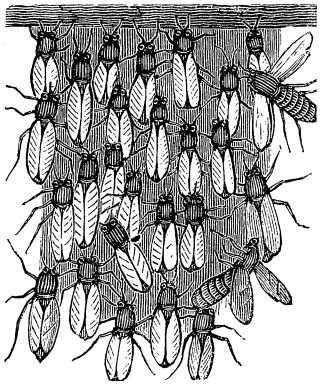
CELLS OF HONEY-BEES.

This is a mere outline of the more common proceedings of these wonderful creatures. There

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are still many other striking curiosities in their history. One of the most wonderful is, that the hexagonal cells for the honey are built upon precisely that mathematical angle which affords the greatest amount of strength with the least waste of material. Mathematicians, after laborious calculations, have verified this fact; ages ago, when the first bees built their cells, the Great Mathematician instructed them, and instinct, which is a perpetual memory, has preserved the knowledge thus communicated, amid the countless myriads of descendants in all countries and all climes.

Another curious fact in respect to these insects is, that when a colony or swarm migrates from the original hive to a new situation, it is necessary first to collect propolis with which every chink and cranny in the place where they mean to build, may be carefully stopped up; and secondly, that a quantity of wax be secreted by the wax-workers to form the requisite cells. The secretion of wax, it would appear, goes on best when the bees are in a state of repose, and the wax-workers accordingly suspend themselves in the interior of the hive in an extended cluster like a curtain, which is composed of a series of intertwined festoons or garlands crossing each other in all directions—the uppermost bee maintaining its position by laying hold of the roof by its fore-legs, and the succeeding one by laying hold of the hind-legs of the first, and so on.



BEES SECRETING WAX.

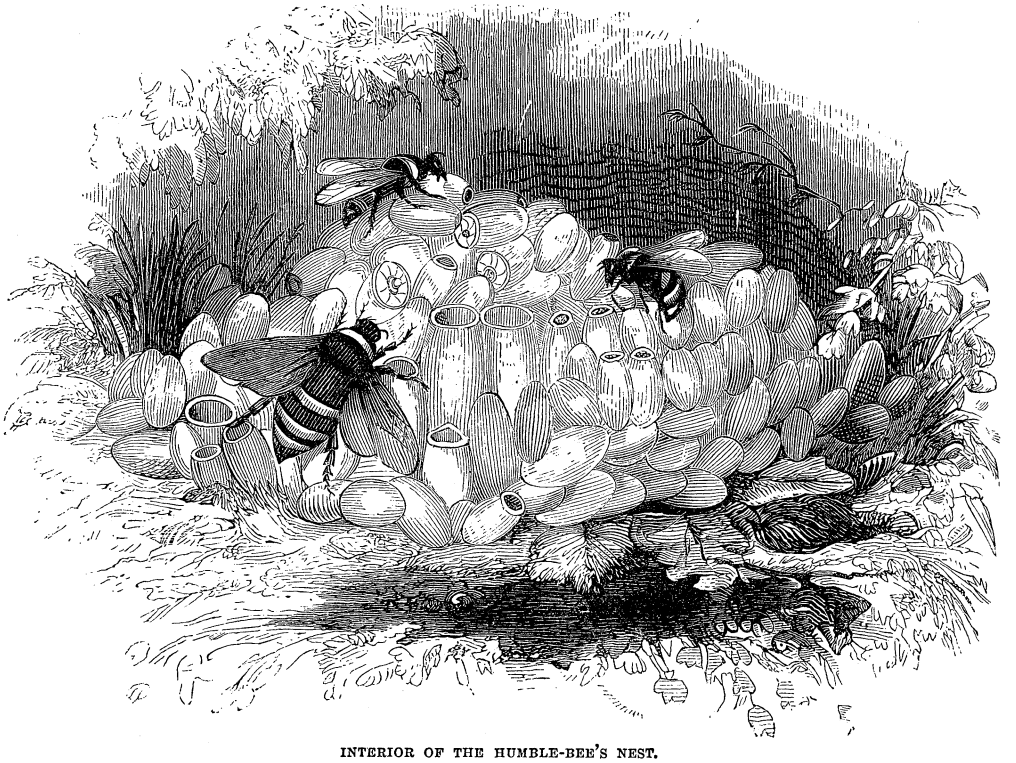
The sting of the bee consists of an extensile sheath inclosing two needle-shaped darts of extreme acuteness; this apparatus is furnished with barbs at the point, so that when it enters the skin, it often remains, not only rendering the wound more painful, but being wrenched from the insect, frequently causes its death. The sting is also provided with an active poison, which distils into the wound and increases the pain. Sometimes the simultaneous attack of a large number of bees upon a person, has proved fatal. The sting of the females is bent, that of the neuters is straight; the males have no sting. This curious means of attack and defense belonging to the bees seems to be a provision of nature, bestowed upon them for the purpose of enabling them to preserve their delicious stores of honey from the multitude of greedy creatures always ready to devour it. A similar stinging apparatus belongs to the humble-bee, wasp, hornet, and many other honey-making species.

Most persons are only acquainted with bees in their domesticated state, but in different parts of the world there are many wild bees, probably of different species, though closely resembling the *Apis mellifica*, in appearance and habits. In our western country, there are many swarms of wild bees, and the hunting of them is almost a profession. As the bee has the faculty of flying straight to its hive, from which comes the familiar expression of a *bee-line*, the bee-hunters are able to discover the place where the hive is situated by taking notice of the point to which several bees direct their flight. In a former part of this work we have noticed the cuckoo of Africa, said to guide the natives of the country to the treasures of honey which they have the art of discovering in the forests; but the practiced bee-hunter needs no such honey-guide.

The *Humble-Bees*, or as they are often called in this country, the *Bumble-Bees*, are of many species, but they all resemble the common honey-bee in their habits. The *Bombus terrestris* is one of the largest and commonest of European species. They usually deposit their eggs in a hole in the ground, which they excavate with their jaws, lining it with moss. When the nest is tolerably well peopled, it presents a mass of oval cocoons spun by the larvæ, interspersed with which are numerous masses of an irregular but generally somewhat rounded form, and of a brown color; some of the largest are about the size of a small walnut. Each of these masses incloses either eggs or larvæ, and is composed of pollen mixed with honey. To these must be added the little honey-pots which are irregularly interspersed with the cocoons. The transformations of these insects, and their various arts and general system of economy, are alike curious and interesting. The American species resemble the preceding.

These species which we have described are called *Social Bees*. Of the numerous other kinds

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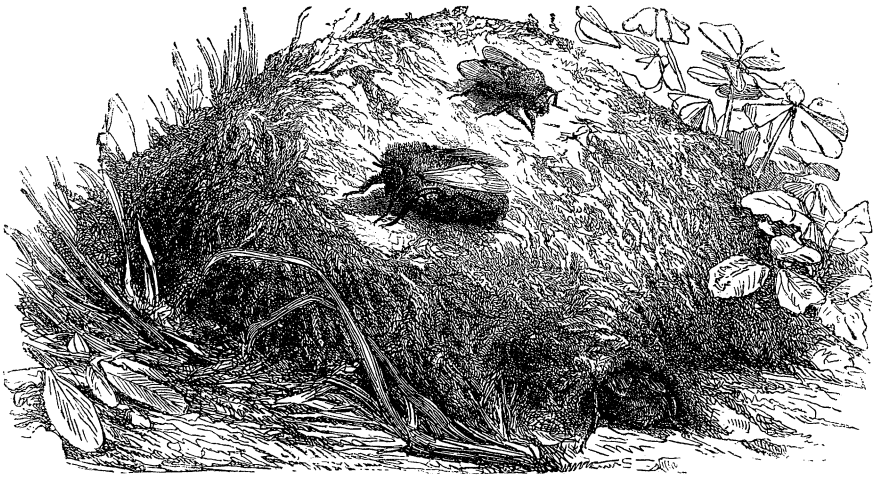


INTERIOR OF THE HUMBLE-BEE'S NEST.

called *Solitary Bees* we can mention only a few species. The *Upholsterer Bees*, of which there are several kinds, line their nests with pieces of leaf, which they cut as neatly as if done with a pair of scissors. One species is called *Osmia papaveris* from her selecting the scarlet petals of the poppy as tapestry for her cells. From these she cuts off small pieces of an oval shape, seizes them between her legs, and conveys them to the nest. She begins her work at the bottom, which she overlays with three or four leaves in thickness, and the sides have never less than two. When she finds that the piece she has brought is too large to fit the place intended, she cuts off what is superfluous, and carries away the shreds. By cutting the fresh petal of a poppy with a pair of scissors, we may perceive the difficulty of keeping the piece free from wrinkles and shriveling, but the bee knows how to spread the pieces which she uses as smooth as glass. When she has in this manner hung the little chamber all around with this splendid scarlet tapestry, of which she is not sparing, but extends it even beyond the entrance, she then fills it with the pollen of flowers mixed with honey to the height of about half an inch. In this magazine of provisions for her future progeny she lays her eggs, where in due time they are hatched.

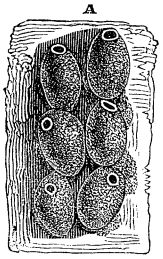
The CARDER-BEES, *Bombi muscorum*, are found in open fields and meadows, usually in haying-time. They select for their nest a shallow excavation in the ground, about a foot in diameter, or if such a one is not to be found, they make one with prodigious labor. This they cover over with a dome of moss, or sometimes with withered grass. They collect their materials by pushing them along upon the ground, working backward like the tumble-bugs. Frequently in the spring, a single female founds the colony, and by perseverance collects the mossy covering in the way described; later in the season, when the hive is populous and can afford more hands, there is an ingenious division of this labor. A file of bees, to the number sometimes of half a dozen, is established from the nest to the moss or grass which they intend to use, the heads of all the file of bees being turned from the nest and toward the material. The last bee of the file lays hold of some of the moss with her mandibles, disentangles it from the rest, and having *carded* it with her fore-legs into a sort of felt or small bundle, she pushes it under her body to

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THE CARDER-BEE'S NEST.

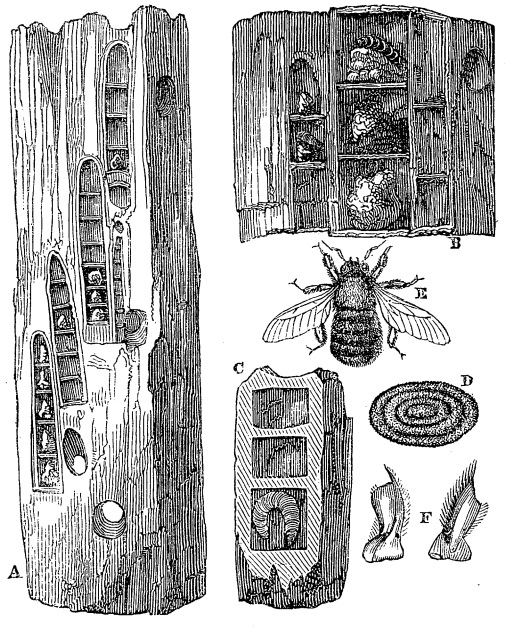
the next bee, who passes it in the same manner to the next, and so on till it is brought to the border of the nest—in the same way as we sometimes see sugar-loaves conveyed from a cart to a warehouse, by a file of porters throwing them from one to another. The elevation of the dome, which is all built from the interior, is from four to six inches above the level of the field. Beside the moss or grass, they frequently employ coarse wax to form the ceiling of the vault, for the purpose of keeping out rain, and preventing high winds from destroying it. Within this retreat the eggs present an appearance not very different from that of the humble-bee, of which we have given an engraving.



THE MASON-BEE.

The Cuckoo-Bees, *Nomadæ*, elegantly and gaily colored insects, save themselves the trouble of nest-making by laying their eggs in the cells of their more industrious brothers.

The Mason-Bee, *Osmia*, of which there are many kinds, makes its cells in spaces which it finds in timber or walls of brick or stone.



THE CARPENTER BEE.

A, B, C, tunnelings of the carpenter bee; E, the carpenter bee; D, a partition; F, teeth, magnified.

The Carpenter-Bee, *Xylocopa*, is partial to posts, palings, and the wood-work of houses which has become soft by beginning to decay. Wood actually decayed, or affected by dry-rot, they seem to reject as unfit for their purposes; but they make no objections to any hole previously drilled, provided it be not too large; and, like the mason-bees, they not unfrequently take possession of an old nest, a few repairs being all that in this case is necessary. When a new nest is to be constructed, the bee proceeds to chisel sufficient space for it out of the wood, with her jaws. We say *her*, because the task in this instance, as in most others of solitary bees and wasps, devolves solely upon the female, the male taking no concern in the affair, and probably being altogether ignorant that such a work is going forward. The female carpenter-bee has a severe task to perform, for though the wood may be tolerably soft, she can only cut out a very small portion at a time. The successive parts which she gnaws off may be readily ascertained by an observer, as she carries

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them away from the place. The patience, art, and industry displayed by this little creature in thus excavating a house for her offspring, are truly wonderful. When, by dint of unremitting industry, she has sunk a shaft of sufficient depth, she deposits at the bottom an egg and a ball of pollen, and then, having prepared some clay, she forms a partition above, at a proper distance, and on this deposits another egg and ball of pollen, making another partition of clay, and so on till the shaft or tunnel is divided into six or eight compartments, each with its egg and pollen for the future grub; the task being at length completed, she covers the external entrance, and so blocks all safely in, leaving the rest to the operations of nature. The wood is not lined with any material, but is worked quite smooth and even.

The Mining Bees, *Andrenidæ*, bore pits in sunny banks, to the depth of six or eight inches, terminating in a little chamber almost at right angles with the entrance. Both the tubular pit and chamber are very smooth, and in the latter is deposited an egg, with a ball of pollen for the grub.



HORNETS AND WASPS AND THEIR STRUCTURES.

THE DIPLOPTERA.

This term is from the Greek *diplos*, doubled, and *ptera*, wings, the species of this family having the wings folded longitudinally when they are at rest. The Common Wasp, *Vespa vulgaris*,

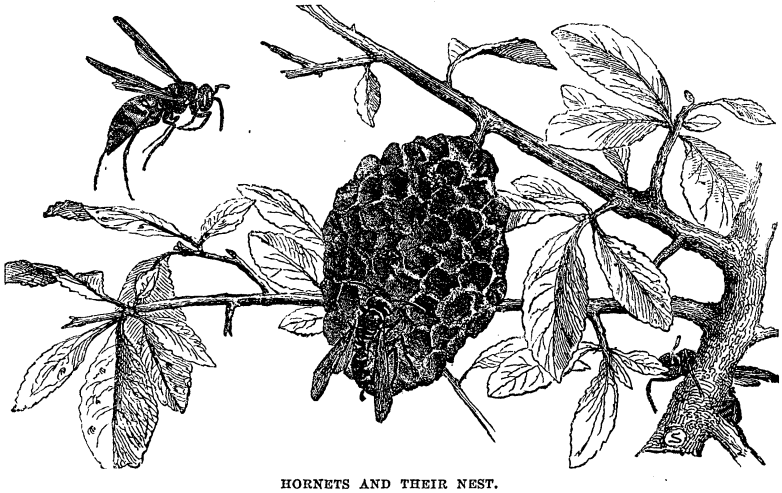
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may be taken as the type. This insect lives in extensive communities, inhabiting a nest formed in holes of walls, buildings, or the ground; the mass of the community, as we shall see among the ants, is composed of barren females, or workers. In the wasps these are winged, so that the difference between them and the queens, or fertile females, is less striking than among the ants. But in addition to these *Social Wasps* there is a considerable number which are solitary in their habits, possessing only individuals of the two sexes, perfect males and perfect females, of which the latter form nests or burrows in which they lay their eggs, after stocking them with food.

The nests of the Social Wasps are formed of a paper-like material, prepared by the insects from wool and other vegetable matters, which they masticate until it acquires a pulpy consistence, and then apply it to the building of their nests. The outside usually consists of layers of a rather coarser kind of paper, and the interior of the nest is occupied by a series of transverse combs, composed of hexagonal cells, with the mouths downward. The combs are united by little pillars formed of the same material. In these cells the eggs are laid, and the larvæ are constantly fed with honey by the workers. A few species even lay up a store of honey like the bees.

The societies of wasps are entirely destroyed every year at the approach of cold weather—only the young females surviving the winter, and these in a state of torpidity; when the mild weather of spring again calls them into life, they immediately set about the formation of a nest, in which they lay a few eggs, and attend to the larvæ themselves. The first brood consists entirely of workers, which, on reaching the perfect state, relieve the queen of all labor, and the colony then rapidly increases. It is, however, composed entirely of workers until the end of the summer, when males and females make their appearance.

The *Solitary Wasps* usually make their nests of clay or agglutinated sand, generally attaching themselves to walls and palings; a few also burrow in sandy ground. The nest consists of several cells placed close together, and each cell is stored with a supply of insect food for the support of the larvæ.



HORNETS AND THEIR NEST.

The Hornets resemble the Wasps in their habits, but they are noted for their spitefulness and the acute pain inflicted by their stings. There are many species, some building a nest of paper-like materials, and attaching it to the limb of a tree, as is customary with certain European species—the *Vespa Gallica* for instance—and also with the common hornet of this country, others building their vespiaries in the hollows of logs and trees, which they enlarge to suit their purpose. Sometimes they build in a thatch or in the roof of a barn or in holes they find in the coverings of out-houses.

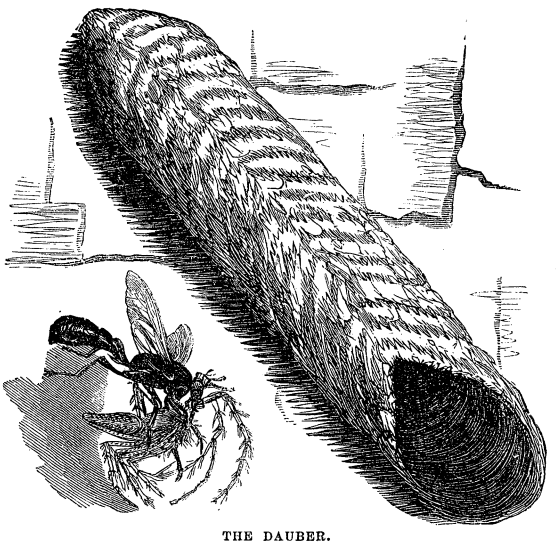
THE FOSSORIA.

These are *Burrowing Hymenoptera*, and are not divided into three kinds like the preceding: they are called Sand-Wasps or Burrowing-Wasps, and excavate little burrows in mud or sand,

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where they lay their eggs. Most of the other hymenoptera which we have noticed, feed themselves and their young on honey; these are of a more predaceous nature. They provide a supply of food for the larvæ, consisting of spiders and other insects which they kill and paralyze with their stings. Gosse gives us the following curious account of them:

"We once witnessed with great interest the efforts of one of these Burrowers, *Pompilus viatica*, to immure a heavy spider. A hole, about as large as a quill, was made in a dusty path through a field, around which was the earth that had been dug out; within a few inches lay a large, round-bellied, dusky spider, *Lycosa*, motionless, which the Pompilus was trying to drag to the hole; it was up-hill, however, and was no easy matter. She caught hold of one of the thighs of the spider with her jaws, and with her tail toward the hole began to tug; but the dust continually gave way under her feet, and she could not make much progress. She would tug for a few seconds, then let go, and run to the hole, descending head foremost, but immediately coming out as she went in, head downward; once, however, she turned in the hole. Sometimes, by sudden exertions, she succeeded in dragging the spider a little way, and once, as she was getting along finely, and had got nearly half up the hill, the round spider suddenly rolled down, dragging the wasp completely over in a somerset. At length we took pity on her, and while she was in the hole, moved the spider to a more favorable position. On coming out, she went to the old spot, but, finding no spider, seemed quite bewildered, wandering to and fro, and now and then tracing the way to and from the hole; soon, however, she found the spider again, and at length succeeded in dragging him to the mouth of the hole. Previously to this, we had observed her dig with the fore-feet for a few seconds at the mouth of the hole, as if conscious that it needed enlarging. Having got the prey up to the mouth, she descended, tail foremost, and tried to draw it down, grasping the thigh close to the thorax; the spider was, however, too large to go in this way, and so she instantly let go, and seized him by the extremity of the abdomen, where she had not touched him before, and drew him down. Even thus, it was a tight squeeze, but at length he disappeared within the hole, and, as the wasp did not appear for some time, we left the place. All the time she was dragging him her wings were shut, but in constant motion, flirting up and down.



THE DAUBER.

"A South-American genus, *Pelopœus*, allied to the preceding, is called the Dauber, from its singular habit of placing its nest of mud against the walls and ceiling in the interior of the houses. When finished, these nests look like handfuls of clay, which have been thrown up at random and adhered; but inwardly they contain very smooth and regular cells, each containing a grub and a dozen or more of spiders. The construction of these nests, which we have observed with great minuteness, is performed by the Dauber bringing little pellets of clay in her mouth, about as large as peas, one after another, which she spreads and arranges with her jaws; previously to closing them up, she lays an egg in the bottom of each, and places over it, as we have said, from twelve to eighteen spiders, not killed but rendered helpless. The grub spends its life in this dark and solitary prison, and when full grown, having eaten the abdomens of all or nearly all the spiders, forms an oval cocoon of a brittle shelly substance, and goes into pupa; the perfect fly when evolved gnaws its way through the mud walls with its strong jaws, and for the first time beholds the light."

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ANTS AND THEIR STRUCTURES.

THE HETEROGYNA.

This tribe, which includes the various kinds of Ants, is composed entirely of insects which live in communities, consisting of three distinct kinds of individuals—*males*, *females*, and *neuters*. The males and females are winged, the former during the whole, the latter during a part only of their existence in the perfect state. They make their appearance in great numbers at a particular period of the summer, when they quit the nest in which their preparatory stages have been passed, and pair in the air. When this has been accomplished, the males speedily die; the females lose their wings and crawl about upon the ground until they fall in with some neuters, which immediately seize upon them and convey them to their nest. The neuters, which form the bulk of the community, are in reality females, in which, probably from difference of food in the larva state, the sexual organs have remained undeveloped. Like the perfect females, they are furnished with a sting. It is upon them that the entire labor of the society devolves; they form the nest, carry off the eggs when laid by the female, and attend to the larvæ, feeding them with the utmost care.

The houses of ants exhibit a great diversity of structure; but the larvæ are never inclosed in

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cells, as in the social bees and wasps. The nest consists of numerous chambers, communicating by winding passages, excavated sometimes in the ground, sometimes in heaps of earth, or other matters raised above the surface, and, in some cases, in the trunks of old trees. Some exotic species build their nests on trees, walls, and the roofs of houses, composing them of earth mixed with other substances, of the excrement of animals, or of vegetable matters. In whatever manner the nest is constructed, however, the chambers in its interior serve for the protection of the larvæ and pupæ, which are carried from chamber to chamber by the workers, so as to insure their exposure to the temperature best suited for their development. Thus at night the young animals are carefully stowed away in the innermost chambers of the nest; every aperture being kept closed, to prevent the ingress of the cold night-air. But as soon as the rays of the morning sun fall upon the surface of the nest, the workers busily commence carrying their infant treasures to the upper chambers, where, close under the roof, they may enjoy the genial warmth. Not unfrequently they even place them for a time on the outside of the nest, exposed to the direct rays of the sun. At the approach of night, or of a shower of rain, the business is reversed; every worker is engaged in carrying the larvæ down into the lower chambers, and in closing up the entrances to the nest against the unwholesome cold or moisture.

Although the ant has been, from time immemorial, the type of industry and providence, from a general belief that it laid up a store of grain in the summer season to serve for its support during winter, it is certain that most are decidedly carnivorous in their habits, although they often evince a great predilection for saccharine juices—as is well understood by housekeepers—and the aphides which yield the coveted honey-dew. It is not improbable that the idea of their providence may have had its rise from their having been seen, as is often the case, carrying the cocoons in their mouths. So far are the ants from deserving to be regarded as furnishing a model of industry, that some of them occasionally get tired of their labors, upon which they go forth to attack a neighboring community, and, having conquered them, make slaves of their progeny; they seize upon the eggs and cocoons, transport them to their hillock, and when they are hatched, charge them with all the labors of the community. It has been said that during the winter the ants imprison some aphides, and feed on the honey they yield; but this is improbable, as ants are torpid in winter. In some cases fierce battles between different communities of ants take place, in which thousands are engaged, manifesting the greatest rage and excitement. After one of these conflicts, the scene of the fight is usually strewed with heads, legs, bodies—broken and torn—bearing no inconsiderable resemblance to a human battle-field.

The observations of naturalists leave little doubt that these insects have the power of intercommunication. This is seemingly not effected by any sound, but by touching each other with their heads or antennæ, for on this being done, thousands will crowd to the point of danger. In the obstinate wars which one colony of ants will sometimes carry on against another, individual ants have been seen thus to give such signals as to change the route of a whole army; and authors worthy of credit assure us that individual ants have been known to quit the main body, and repairing to the hillock, return with strong reinforcements.

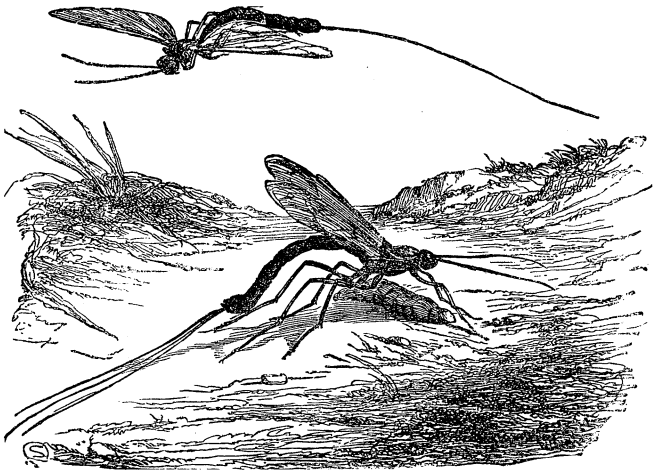
The ants with which we are acquainted in temperate climates—though some species are troublesome—are innocent in comparison with several kinds found in tropical climates. Sometimes they come in swarms into the houses, from which they speedily expel the inmates, biting and stinging severely. One of these species, the *Atta cephalotes*, inhabits the West Indies and is called the *Visiting Ant*.

THE ENTOMOPHAGA.

This term, from the Greek *entomos*, an insect, and *phago*, to eat, signifies *Insect-eaters*, and is applied to an immense number of creatures which have the constant habit of passing their larva state as parasites upon other insects. These are well known under the name of *Ichneumon-Flies* and *Cuckoo-Flies*. Insects of every order, and in every stage of their existence, are subject to the attacks of these creatures. They introduce their eggs into the bodies of their victims by piercing them with their long and slender ovipositors. Minute size is no protection, for many species lay their eggs even in *aphides*, *cocci*, and the larvæ of other small insects. The ichneumons, with long ovipositors, as the European species, *Ichneumon manifestator*, seek the

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burrows of the wood-boring insects, whose larvæ they are enabled to reach by means of this organ. Each species usually infests a particular species of insect; and, singular as it may appear, many of these parasitic larvæ are again preyed upon by others, whose parents are directed by an unerring instinct to the selection of the proper position for the nourishment of their offspring.



ICHNEUMON MANIFESTATOR.

Many of them, and especially the larger species, only lay a single egg in their victim; but the larvæ of many of the smaller species exist in familes of a hundred, or even more, in the bodies of caterpillars and other insects. The species of Ichneumon-Fly are exceedingly numerous, in most parts of the world; the largest in the United States is the *Pimpla lunator*, popularly called *Long-stinger:* the body of this is an inch and a half long, and the ovipositor three inches.

One species of Cuckoo-Fly, the *Chrysis ignita*, well known in Europe under the name of *Ruby-Tail*, generally exhibits a gem-like brilliancy of color, the thorax being usually of a fine metallic blue or green, and the abdomen of a most splendid ruby color. They are mostly of small size, and may be seen, in the hottest sunshine of summer, running about upon walls, palings, and sand-banks, in search of the nests of wild bees and other hymenopterous insects, upon which their larvæ are parasitic. Mr. Westwood observes that they deserve the name of *Cuckoo-Flies* more than any other parasitic insects, as it appears that in most cases their larvæ feed rather upon the store of food laid up for the nourishment of their host than upon the host itself, although they doubtless finish by devouring the rightful inhabitant of their usurped domicile.



GALL INSECTS.

THE GALLICOLA.

This term, from the Latin *galla*, the oak-apple, and *colo*, to inhabit, is applied to a tribe of insects which are almost exclusively vegetable feeders, and includes the well-known GALL-IN-

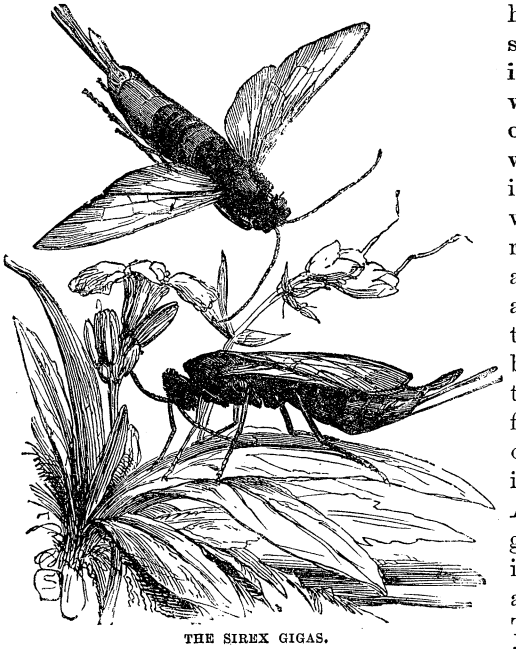
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SECT, *Cynips gallæ tinctoriæ*. The females of these puncture the leaves, buds, and other parts of plants and trees, depositing an egg in the wound, accompanied probably by some irritating fluid, which causes a diseased growth in the part, and thus produces the excrescences known as *galls*. Within this domicile the larva lives, feeds, and attains its maturity. Here it also undergoes its transformations, and it is not until its arrival at the perfect state that it eats its way out, and becomes a free denizen of the air.

The forms of the galls vary according to the plant on which they are found, and the species of gall-fly by whose puncture they are caused. The oak is especially subject to the attacks of these insects. The leaves are often covered with small round galls, produced by the *Cynips quercus-folii*, and several other species attack those organs; while the well-known oak-apples are produced by a species—*Cynips terminalis*—which deposits its eggs in the extremities of the shoots. Other species of oaks are equally infested by these creatures, one of which, noticed above, produces the well-known and important galls of commerce, often called *Nut-Galls*, and used for making ink and as a chemical test. The *Dead Sea Apples*, which have been the subjects of frequent controversy, are also galls, produced by the puncture of a small insect described by Mr. Westwood under the name of *Cynips insana*. The spangles of the oak-leaves are also produced in this manner. These excrescences usually contain only a single larva; but in some cases a large family of grubs are concealed in a single gall. A few species are parasitic in their habits.

THE SECURIFERA.

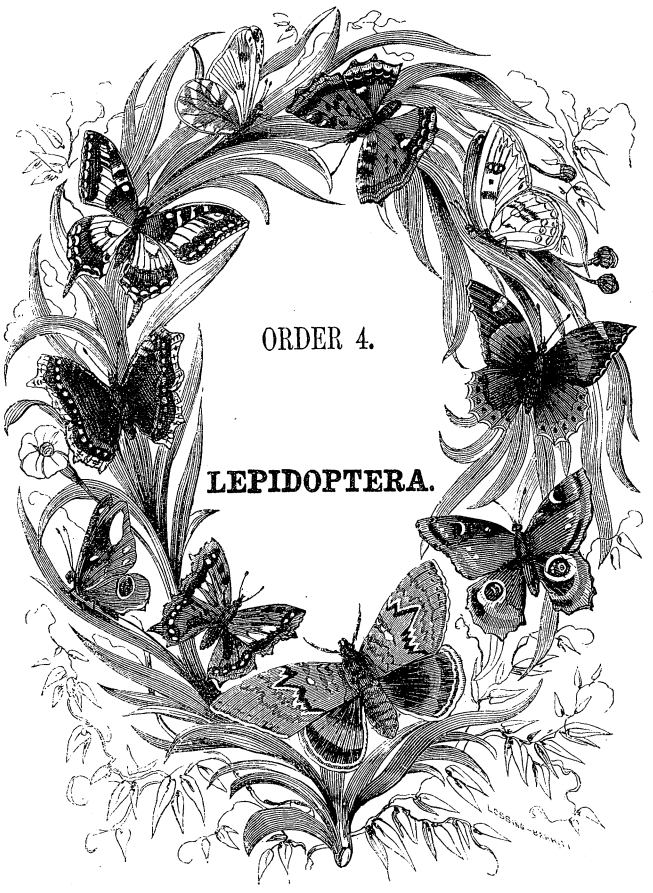
Under this name are included a large number of insects—the *Phyllophaga*, known as *Saw-Flies*, and the *Xylophaga*, or *Wood-Gnawers*, known as *Tailed Wasps*. The females of the former have the ovipositor in the form of a fine, sharp saw; with this she cuts numerous minute slits in the stems or leaves of plants, in each of which she lays an egg, accompanied by a drop of fluid, which prevents the closing of the wound, and in some cases the irritation thus induced causes the formation of a gall, within which the larvæ live and feed. As a general rule, the larvæ, when hatched, leave their shelter and feed upon the leaves of plants. The species are generally confined to certain kinds of plants, to which, when they are produced in great numbers, they often do immense mischief. Thus the larvæ of the *Athalia centifoliæ*, known to farmers as the *Nigger* or *Black Caterpillar*, have occasionally done incredible damage to turnips in Europe; and those of another species, the *Nematus grossulariæ*, are not less destructive to gooseberry-bushes. The larvæ of other species infest fruits, living and feeding in the interior, and causing them to fall off while still immature. They are almost always furnished with pro-legs in addition to the thoracic members. The *Cimbex ulmi* is an American species, frequenting elm-trees.



THE SIREX GIGAS.

In the *Tailed Wasps*, *Horntails*, or *Wood Wasps*, also often called *Borers* in this country, the ovipositor projects from the abdomen, and is composed of serrated bristles, with which they perforate timber. On the continent of Europe the *Sirex gigas* often appears in immense numbers, and does great damage in this way. The *Pigeon Tremex* of Harris, *Sirex cinctus*, is one of the American species; this sometimes completely riddles the trunks of maples, button-woods, &c.

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ORDER 4.

LEPIDOPTERA.

This term is derived from the Greek *lepis*, a scale, and *ptera*, wings, and refers to the scales on the wings of moths and butterflies, these insects constituting the order. These must be ranked among the most elegant of the denizens of the air. The delicacy of the forms of many species, the charming contrast of color often exhibited in their wings, and the gem-like brilliancy of others, must always render them most attractive objects. "Moths and Butterflies," says Professor Jaeger, "in comparison with the other orders of insects, are well entitled to the rank of nobility, for among them we find no impudent beggars and spongers, as among the flies; no parasites as in some of the wingless insects; no working class, as among the hymenopterous insects—bees, wasps, and gall-flies; no musicians, as among the family of crickets, grasshoppers, katydids, and cicades; but all of these are aristocratic idlers, who, dressed with silver, and gold, and purple, and ornamented with ever-varying splendor, have naught to do but to seek their own pleasure, and charm away their brief existence, fluttering from bough to bough, and satiating themselves with the sweet nectar of flowers."

The structure of the mouth is almost sufficient to distinguish a lepidopterous insect from one belonging to any other order. The suctorial organ consists of a spirally-rolled trunk attached to the lower part of the front of the head, and reposing, when coiled up, between the hairy palpi.

The wings are four in number, membraneous, generally flat, furnished with branching nervures. They are usually covered with minute scales, popularly called *feathers*, which are, in reality, only a peculiar form of the hairs with which the wings of most insects are furnished. They are set very close together, usually more or less flattened, and laid over one another in the manner of tiles upon the roof of a house. Their form varies greatly in different species, and even on different parts of the wings of the same species. It is entirely to these scales that the beautiful colors of

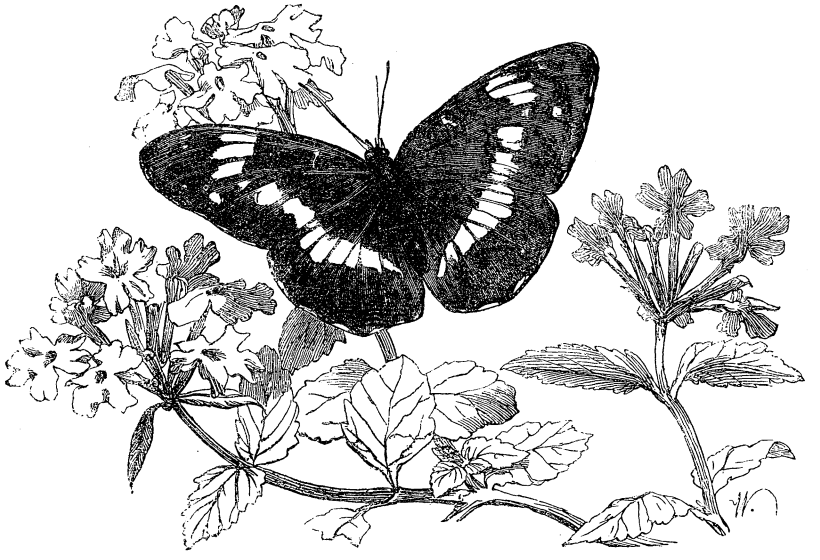
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these insects are due; and the metallic tints exhibited by many species are owing to the presence of very delicate stripes upon the scales.

The larvæ of the Lepidoptera are well-known as *Caterpillars*. These are generally more or less cylindrical, composed of thirteen segments, of which the anterior forms a horny head furnished with jaws and antennæ, and usually with groups of simple eyes. The jaws are strong and well-adapted for biting the fine vegetable tissues on which the most of them feed.

The duration of the larva state is very variable in these insects; many of them producing two broods annually, while others occupy two or three years in arriving at their perfect condition. In their larva state they are exceedingly voracious, often doing immense damage to vegetation: most of them accordingly grow rapidly, and shed their skins several times before attaining maturity. When this period has arrived, the caterpillar seeks some sheltered spot in which to undergo its change to the pupa form. Some species select the lower surface of leaves and branches for this purpose; others, clefts and hollows in the bark of trees, walls, or palings; while others bury themselves in the earth. Those which remain in the air suspend themselves in various ways by means of their silky secretion, and some inclose themselves completely in a silky cocoon. This is also done by some of those which conceal themselves in the earth; but many of these only line their cavity with a sufficient quantity of silken threads to keep its walls from falling in upon them. The pupa is entirely inclosed in a horny case, in which the position of the wings and limbs is indicated, externally, only by lines and other elevations.

In their preparatory stages the Lepidoptera are exceedingly liable to be destroyed by numerous species of parasitic insects, which lay their eggs in the larva; the latter still continues to feed, and frequently even effects its transformation to the pupa state, without exhibiting any indications of the work of destruction which is going on within. These parasites, assisted by the insectivorous birds, keep the numbers of caterpillars within moderate limits. Without these checks they would soon destroy the fruit of the labors of the gardener and the husbandman.*



THE SYBIL BUTTERFLY.

The perfect insect, on first emerging from the pupa case, usually has the wings soft and crumpled; and it is not until some little time after it has set itself free from its prison that its

* There are said to be twelve hundred species of lepidopterous insects in this country, and the numbers of each are of course beyond computation. One female will produce three hundred eggs a year, and if her offspring were to go on at that rate of increase, in four years her progeny would be eight thousand one hundred millions. The necessity of powerful checks upon such prolific and voracious species is obvious. The birds are immense destroyers of caterpillars. A single woodpecker will destroy fifty or sixty a day; thus one million of woodpeckers, during the months of April, May, June, and July, will destroy six billions annually.

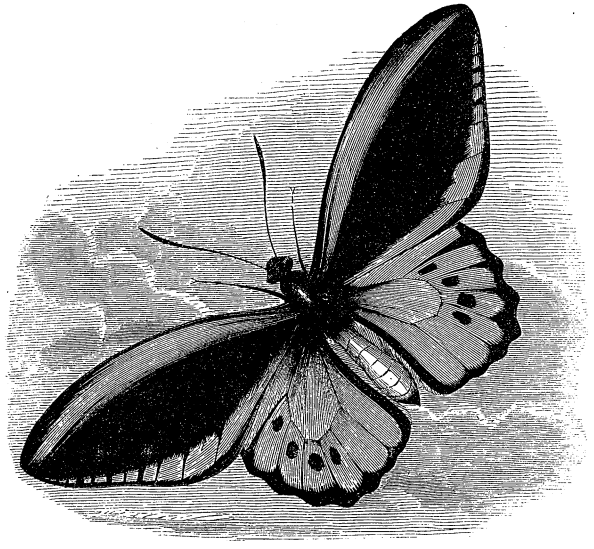
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wings become sufficiently expanded to be available for flight. Many butterflies, immediately before taking their flight into the air, eject a red fluid from the anus, which, of course, forms a red spot wherever it falls; and this—when, as is sometimes the case, vast quantities of some species of butterfly have simultaneously attained the perfect state, in a particular district—has given rise to the stories of *bloody rain.*

These insects are divided into two great groups or sub-orders, the *Rhopalocera* and *Heterocera.*

THE RHOPALOCERA.

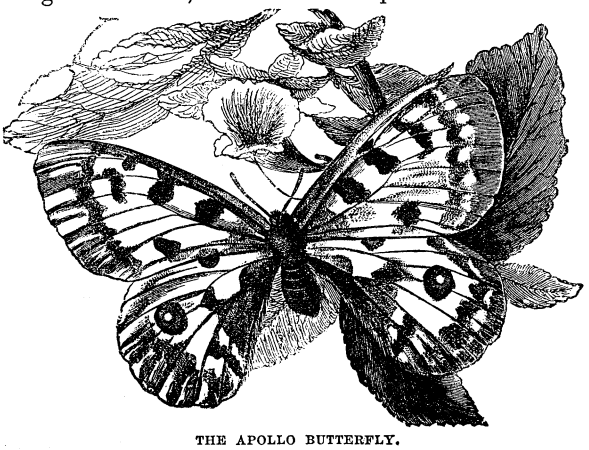
This name is derived from the Greek *rhopalon*, a club, and *keras*, a horn, and is descriptive of the club-shaped form of the antennæ of these insects—the *Butterflies*, the most charming of the insect creation. They form only a single tribe, which, however, is divided into numerous families and sub-families. They are all diurnal in their habits, fluttering about from flower to flower in the hottest sunshine, and nearly all of them carrying their wings upright over their backs in repose. It is in hot climates that the largest and most magnificent species abound. Under the burning rays of the tropical sun, brilliantly metallic species sport like living gems, and even those not adorned with metallic tints exhibit an elegance and variety of coloring which is perhaps not surpassed by any other productions of nature. We can only notice a few prominent species.



THE PRIAM BUTTERFLY.

The Priam Butterfly, *Papilio Priamus*, is a native of the Eastern Archipelago; its wings are from seven to eight inches in extent, and are colored with rich green and deep black. This is one of the most beautiful species of the order, and living in a climate of perpetual summer, and amid the most gorgeous of flowers, is one of the glories of nature.

The Apollo Butterfly, *P. Apollo*, is found in the damp meadows of the high Alps; the wings are whitish, with five black spots on each of the superior ones; on the inferior are two sparkling eye-like figures, bordered with black. It flies in June and July. Thus even wild mountain regions, as well as those of the florid tropics, are embellished by this beautiful family.



THE APOLLO BUTTERFLY.

The Flame Butterfly, *P. podalirius*, of Europe, has yellow wings, the upper as well as the lower ones crossed with black rays, in the form of flames. The caterpillar of this species is found on plum-trees, peach-trees, and the like.

The Sybil Butterfly, *P. Sybilla*, sometimes called the *Mourning Butterfly*, is a common European species, flying in the dog-days, the upper part of the wings of a brownish-black, with a white band across the middle; beneath they are of an ashy-blue, with black spots.

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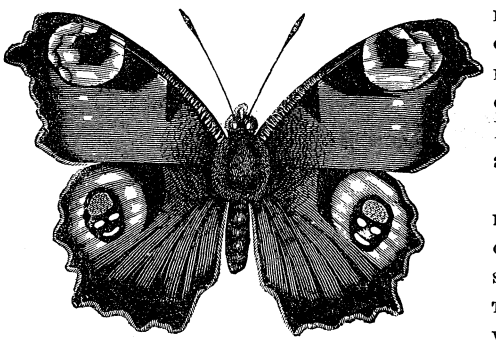
The GALATEA BUTTERFLY, *P. Galatea*, a Eurodean species, called *The Half-Mourning Butterfly*, has the wings slightly denticulated; they are of a brownish-yellow, with the base and extremities black, and spotted with white.



THE HALF-MOURNING BUTTERFLY.

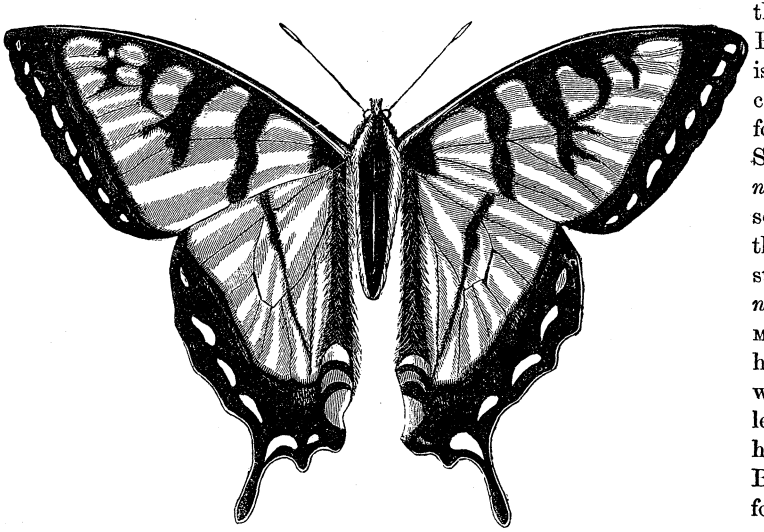
There are many other splendid examples of the beautiful genus Papilio. Of the genus *Vanessa* the MOURNING-CLOAK, *V. Antiope*, is a celebrated species, which seems to be found both in Europe and America. Its wings are of an angular form, of a deep purple color, with a large yellow band, dotted with blue along the edges. It inhabits woods and meadows during the summer; the caterpillars are black and thorny, and often nearly destroy the foliage of birch, elms, and other ornamental trees. They may be easily killed with soap-suds.

The PEACOCK-BUTTERFLY, *V. Io*, has the edges of the wings denticulated; above they are of a reddish-fawn, with a large eye-spot on each; those on the superior wings are red, encircled with mingled black and yellow; those on the inferior ones are blue, with a black circle. It is a splendid European species, inhabiting woods, meadows, and gardens in October.



THE PEACOCK-BUTTERFLY.

Though our butterflies do not rival the more magnificent species of tropical America and of other portions of the torrid zone, we have many species of exceeding beauty. The TROILUS BUTTERFLY, *Papilio Troilus*, is a superb insect, the wings denticulated, black, spotted with yellow, and terminated by a swallow-tail. It lives on spice-wood and sassafras-trees; is rare in the Northern States; common in the Southern, and in the West Indies. The PHILENOR, *P. Philenor*, is smaller than the preceding, but resembles it; found in the Southern States. The *Papilio Turnus* is a large and handsome species, common in the northern and middle states. Of the genus *Vanessa* we have the ADMIRAL, *V. Atalanta*, which has black velvet-like fore-wings, marked with scarlet and white, and black hind-wings: the THISTLE BUTTERFLY, *V. cardui*, found in Europe as well as America, and called



THE PAPILIO TURNUS.

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there the *Painted Lady:* the GOLDEN C. BUTTERFLY, *V. C. aureum*, marked behind the wings with a golden C: and many others.

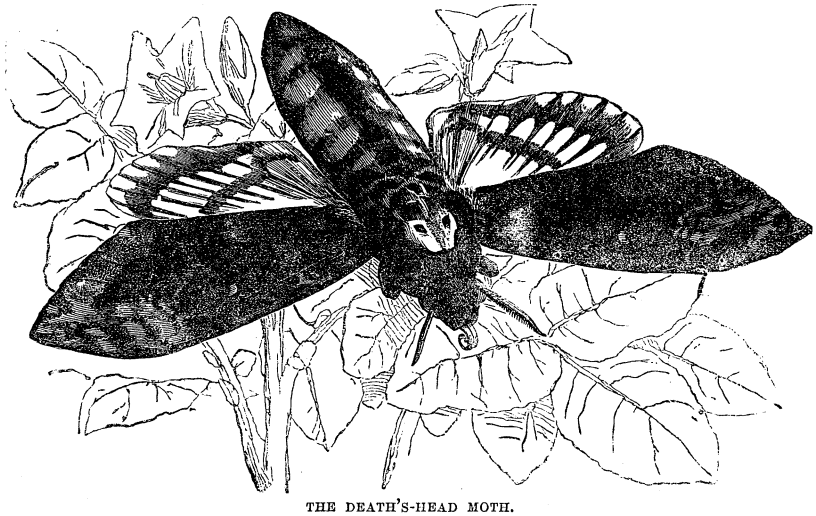
The BERENICE, *Danaus Berenice*, has dark red wings, with black rims and a black border, with two rows of white spots. It feeds on the poisonous leaves of the different kinds of milkweed.

The IDALIA, *Argynnis Idalia*, has the fore-wings red, with black marks, and the hind-wings bluish-black on the upper sides; the under sides of all the wings are covered with silvery spots.

Of the smaller butterflies, some of which are beautifully colored, there are almost innumerable species. Among them is the LITTLE YELLOW BUTTERFLY, *Colias Philodice*, which we often see in the late summer and early autumn months flying over the meadows, and gathering in flocks in wet places in the highways. There are several species of Colias, all of which are more or less of a bright yellow color.

THE HETEROCERA.

This term is from the Greek *heteros*, various, and *keras*, a horn, and refers to the diversified forms of the antennæ of the species of this extensive and interesting group. They are called *Moths*, and are mostly either crepuscular or nocturnal in their habits, though many fly by day. They include numerous tribes, some of which we shall briefly notice.



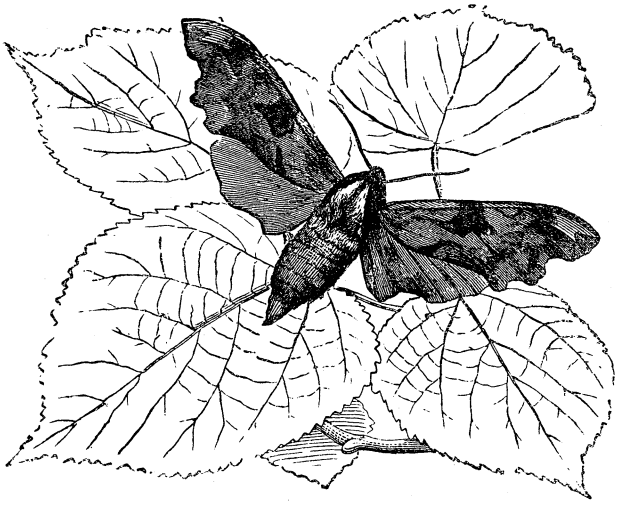
THE DEATH'S-HEAD MOTH.

THE SPHINGINA.

Of this tribe there are many species: they have the antennæ thickened in the middle or toward the end, but terminate in an acute point. They are generally prismatic in their form; the wings are long and narrow, but firm, and adapted for powerful flight; the trunk is almost always well developed, sometimes longer than the body. The name of *Sphinx*, applied to the typical genus of these insects, is derived from the habit of the larvæ of sitting with the head and forepart of the body raised in an attitude which, to a fanciful imagination, bears some resemblance to the Sphinx of the ancients. Most of these insects fly in the twilight; but some are to be found hovering over flowers in the brightest sunshine, extracting the nectar by means of their long trunks. They are generally of considerable size; the most remarkable species is the DEATH'S-HEAD MOTH, *Acherontia Atropos*, a large kind, variegated with dark brown and yellow, bearing upon the back of the thorax a deep orange mark, presenting no inconsiderable resemblance to the front of a human skull. Hence this insect has been regarded as ominous of pestilence—a feeling probably not diminished by its power of emitting a plaintive squeak when disturbed. The larva is very partial to the potato-plant, and the pupæ are often turned up in digging potato-grounds. The moth, which has a very short trunk, is a great enemy to bees, invading their hive and feeding upon their honey. It is supposed to frighten the bees by the squeaking noise above referred to,

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for though it possesses no weapons, and the bees are well armed, they never appear to attack the intruder. This species is common in Europe.



THE LIME-TREE SPHINX.

The Lime-Tree Sphinx, *Sphinx tiliæ*, has the wings denticulated and angular; it is nocturnal, and flies heavily. It is common upon elms, horse-chestnuts, and especially limes, where the caterpillars of the species abide.

A considerable group of insects belonging to this tribe have transparent wings. Among them is the Humming-bird Moth, *Sesia pelasgus*, often seen at evening in our gardens during the months of June and July, hovering like a humming-bird over the flowers and sucking their nectar with its long tube.

THE PSYCHIDÆ.

This is a family of small moths, the larvæ of which form portable cases for their protection, in which they undergo their transformations.



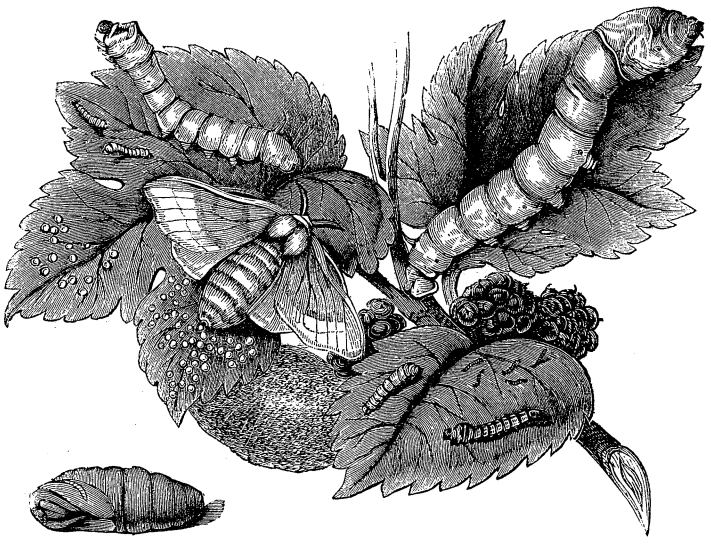
THE HUMMING-BIRD MOTH.

THE BOMBYCINA.

This includes some of the largest species of the order, and among them the Silk-worm Moth, *Bombyx mori*. This important insect is a native of the north of China; and a great portion of the supplies of silk for Europe and America are still derived from that country. It was introduced into the south of Europe in the sixth century of the Christian era, when some of the eggs were brought to Constantinople, whence the insects have gradually spread into Italy and France—in both which countries the cultivation of the silk-worm is an important branch of industry. When the insect is full grown it quits its food, and betakes itself to some convenient spot, where, after spinning a few threads in various directions, it suspends itself in the midst of them; and by continually twisting its body, it gradually envelops itself in a thick silken cocoon. By reeling this carefully off, a delicate unbroken thread, sometimes exceeding one thousand one hundred feet in length, is obtained. The silk-worm is usually fed upon the white mulberry, *Morus multicaulis*, though it will eat lettuce and the leaves of the maple, oak, pear, and apple-tree. They are easily cultivated, and the raising of silk received a great deal of attention in this country a few years ago. But labor is so much cheaper in China, Italy, France, and other countries, that silk can be produced there at less cost than in the United States. This pursuit is, therefore, nearly abandoned. The value of all the silk produced annually throughout the world amounts to hundreds of millions of dollars.

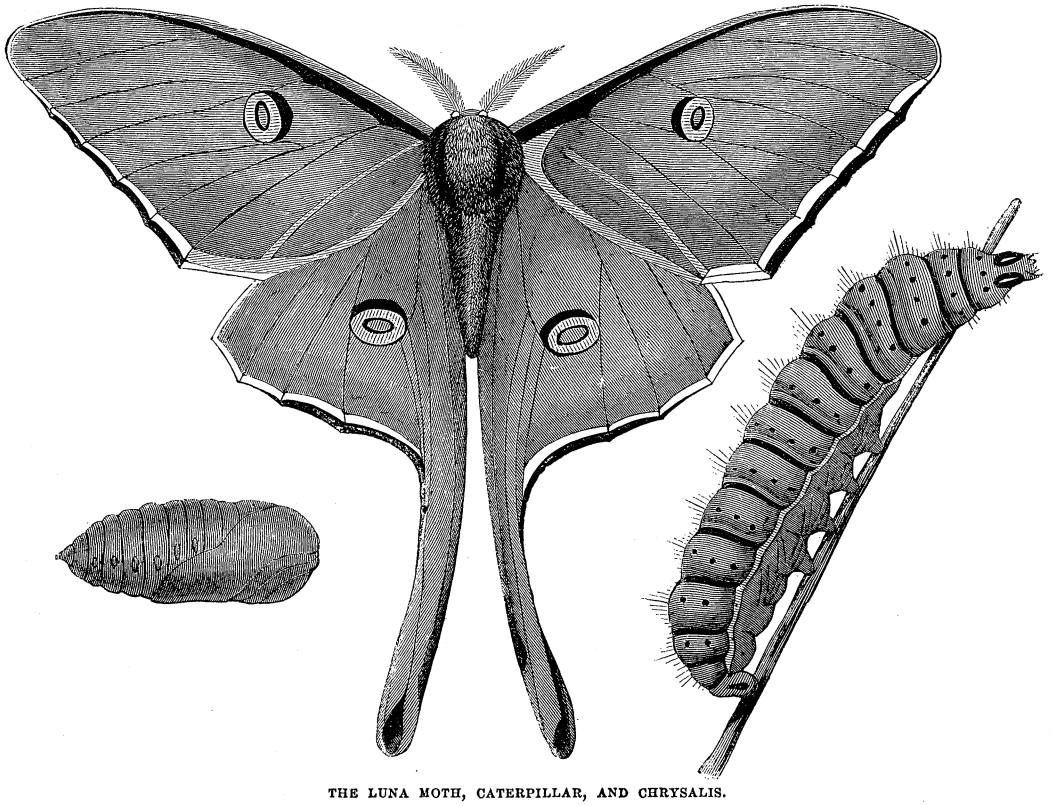
The Arrindy Silk-Worm of India, *B. Cynthia*, furnishes a silk which is said to possess astonishing durability. The caterpillar feeds upon the castor-oil plant, and has recently been introduced

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THE SILK-WORM MOTH, CATERPILLAR, AND CHRYSALIS.

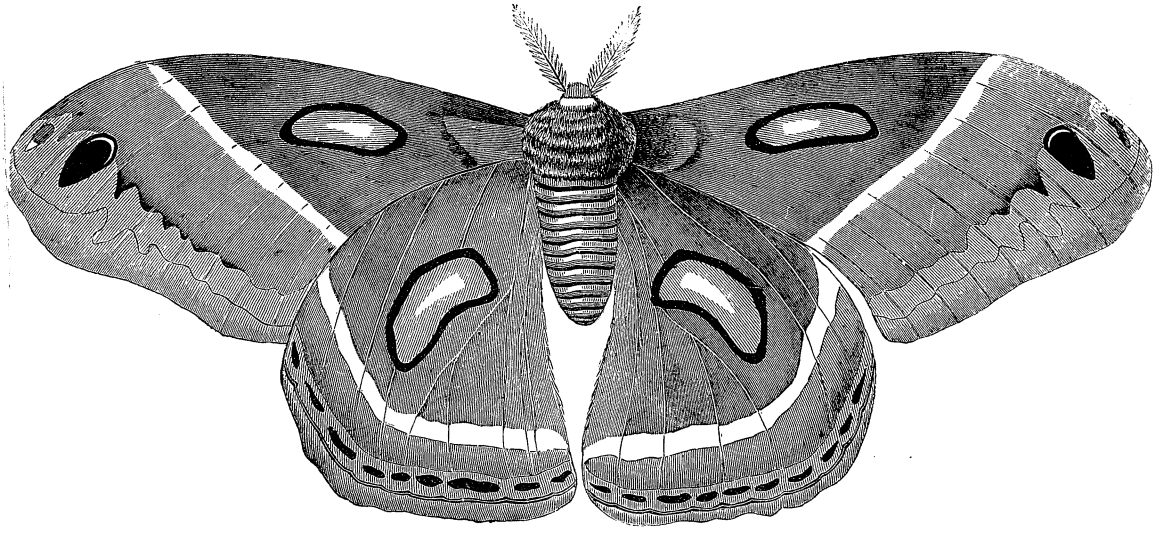
into the south of Europe, and into the French possessions in the north of Africa, with every probability of success. Several other species of these insects furnish silk.



THE LUNA MOTH, CATERPILLAR, AND CHRYSALIS.

Among the larger and more splendid moths of our own country is the LUNA MOTH, or GREEN EMPEROR MOTH, *Attacus luna*, a large and beautiful species, common in the Northern United States. The wings, which are drawn out into what appears like a long tail, are of a light

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THE CECROPIA MOTH.

yellowish-green color, marked with eye-spots near the middle. The expanse of the wings is four inches. The caterpillar lives on walnut-trees, and spins a cocoon of which silk might be made. Many of these cocoons may be picked up on the ground, in autumn or spring, beneath the trees frequented by these insects.



PROCESSIONARY CATERPILLARS.

The Corn Emperor Moth, *Saturnia maia*, is reddish-yellow above, and has three and a half inches expanse of wing. The Pale Emperor Moth, *Orgyia leucostigma*, is a small species handsomely variegated.

The Prometheus Moth, *Attacus Prometheus*, is of a deep smoky brown, its expanded wings measuring four inches; the eggs are deposited in clusters, often on the lilac-bush, where the cocoons, which are an inch long, may be observed, attached longitudinally to a leaf, in a manner to be protected by it.

The Polyphemus Moth, *A. Polyphemus*, is of a dull ochre color, somewhat clouded with black; the wings are ornamented with an eye-like spot, and have an expanse of six inches. The caterpillar inhabits the oak and elm, and may be found in August and September.

The Cecropia Moth, *A. Cecropia*, is of a dusky reddish-brown; the wings expand six inches, and are handsomely variegated. The caterpillar is of a light green color and is found on various fruit-trees.

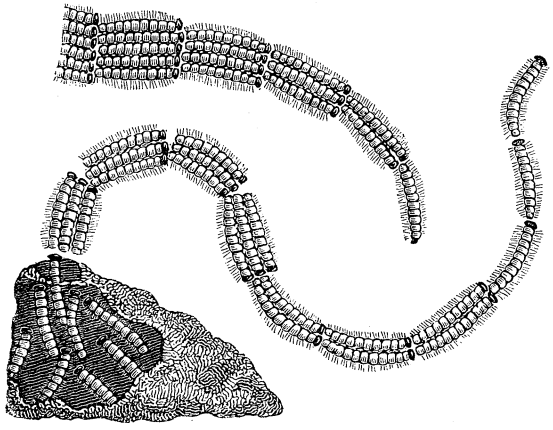
The Regal Walnut Moth, *Ceratocampa regalis*, is one of the largest and finest of our moths; the wings are olive-

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colored, and extend from six to six and a half inches. The caterpillar is four or five inches long, of a green color banded with pale blue, and feeding on the walnut.

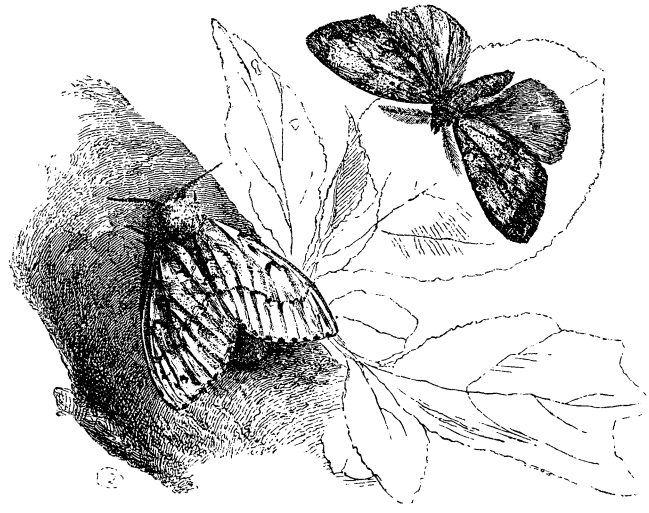
Among the great variety of other insects of this kind, common in our country, we must not omit to mention the destructive TENT CATERPILLAR, *Clisiocampa Americana*, of which the moth is a small reddish-brown insect, flying in at the windows, and burning its wings in the lamp, at night; it comes to maturity in June, at which time it breaks up its encampment and seeks some crevice in which to make its cocoon. The eggs deposited in rays around the twigs of the trees, are hatched in April or May, when the insects spin from their mouths a large tent-like or spider-like web, into which they retire at midday and at night. They are among the most destructive of insects to the fruit-trees, and though the birds destroy great numbers of them, they need the extirpating exertions of farmers and gardeners. The FOREST TENT-CATERPILLAR, *C. sylvatica*, inhabits the oak and walnut and some other trees, and often does extensive damage.

Among the European species one of the most remarkable is the OAK-LAPPET MOTH, *Gastropacha quercifolia*, in which the under wings project on each side of the upper ones when the insect is at rest, giving it a very singular aspect, not unlike a bunch of dead leaves, the insect itself being of a brown color. It is sometimes called the *Dead-Leaf Insect*. Its mode of life in the larva state is not less curious. The larvæ live in a large community within a silken nest, which they weave for themselves; and on leaving it in search of food, they form a regular procession, one taking the lead, followed by a certain number; then come two abreast, then three, and so on, until they sometimes march in ranks of ten or more.



THE PROCESSIONARY CATERPILLARS.

The following precise account of the proceedings of these insects is very curious: "If you walk through the woods toward the close of a fine day in June, you will be able to see the curious spectacle of the evolutions made by caterpillars after sunset. Look closely upon the opening at the upper part of the nest, and you will see one caterpillar come out alone and explore the ground with care; a second immediately follows, a third following the second, and after these come two which touch each other and the one that precedes them; these are followed by three; then comes a row of four, then a row of five, then a row of six, all of these following with precision the movements of the leader. From this circumstance is derived their name of *Processionary Caterpillars*. If the guide stops a moment all the followers halt; if he continues the route, they all hasten after him; if he makes a circuit, they all make the circuit also. Should they find a branch of fresh green leaves, they immediately prepare to feast upon it; the ranks spread themselves upon it, each one touching his neighbor, so that not a part of the branch escapes their depredations.



THE ZIGZAG.

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The repast finished, they return toward the nest, one commencing the movement, and the others taking up the line of march. In this manner they reach their habitation precisely in the order in which they left it."

The larvæ of several allied species have the same singular habit as the preceding.

The GOAT MOTH, *Cossus ligniperda*, which is one of the largest British lepidoptera, also belongs to this tribe; the larva feeds upon the wood of willows, to which it often does immense damage.

The ZIGZAG, *Bombyx dispar*, has a short trunk or tube, not suited for suction; the male is much smaller than the female; his superior wings being brown with black zigzag figures. The female is whitish with black spots on her wings. This is a European species which sometimes does immense damage to the fruit-trees. If handled, it causes intense itching to the hands and fingers.

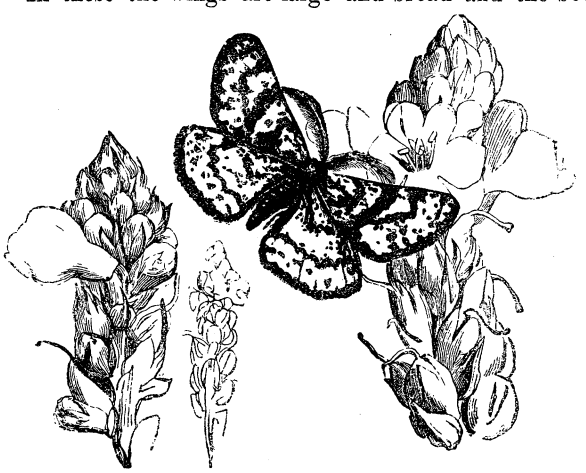
THE NOCTUINA.

This tribe includes a great number of moths of middling or large size, generally of dull colors, and strictly nocturnal in their habits. The antennæ are generally bristle-like, a little longer than the head and thorax; the wings large, the anterior pair longer but narrower than the posterior, which are slightly folded in repose. The caterpillars are generally naked, and furnished with sixteen feet. The pupæ are usually inclosed in a loose cocoon.

A few exceptions to the usual somber coloring of the insects of this tribe are to be met with, principally in species which are moer diurnal in their habits than the rest. The *Catocalæ* and *Triphœnæ* are distinguished by the bright red and orange color of their posterior wings, and the *Plusiæ*, which often fly in the bright daylight, have the anterior wings adorned with metallic tints and markings.

THE GEOMETRINA.

In these the wings are large and broad and the body slender. The name of the group is derived from the structure and habits of the caterpillars, which are popularly known under the various titles of *Loopers*, *Measurers*, *Spanworms*, and *Tailors*. In progression they hold by their thoracic feet, bring the hinder extremities close to these, bending their bodies into a loop, adhering by the pro-legs, and then again extending the fore part of the body for a fresh step. In this manner they proceed, apparently measuring the ground over which they travel, whence they have received the names above as well as that of *Geometricians*. Many of them present a close resemblance, in color and texture, to a piece of dry twig, and they take advantage of this to deceive their enemies, adhering often for hours to one spot by their pro-legs, with the remainder of the body stretched out in a straight line. One species, the European *Fidonia Plumistaria*, is distinguished by curious feathery antennæ.



THE FIDONIA PLUMISTARIA.

The caterpillars of these insects are also very injurious to fruit-trees; those of the EUROPEAN MAGPIE MOTH, *Abraxas grossulariata*, which inhabit gooseberry bushes, often strip them entirely of their foliage.

The AMERICAN CANKER-WORM MOTH, *Anisopteryx pometaria*, belongs to this abundant and prolific tribe. The caterpillars are usually hatched from their eggs in the spring; when grown they are about an inch long, and of various colors. They attack apple-trees, and sometimes strip whole orchards of their foliage; they also devour the leaves, buds, and blossoms of plum, cherry, and other fruit-trees, and also of ornamental and shade trees.

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The Lime-tree Span-Worm, *Hibernia tiliaria*, is common in early summer on our elms, poplars, limes, and other ornamental trees, and is often very destructive.

THE PYRALIDINA.

In these the wings are triangular and elongated; the legs very short. The caterpillars live on leaves; those of the *Pyralis vitis* are very destructive to grape-vines, and also to orchards; the *P. farinalis* lives upon meal, and the *Aglossa pinguinalis* on butter, grease, and similar substances.

THE TORTRICINA.

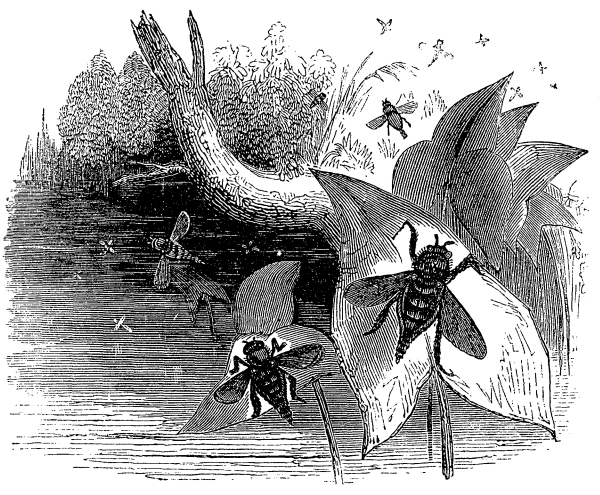
The larvæ of this tribe possess sixteen feet, and live on the leaves of trees and plants, which they roll up in a sort of tube, within which they feed and undergo their metamorphosis. Hence they are called *Leaf-Rollers*. They are often injurious to orchards.

THE TINEINA.

This tribe includes a multitude of minute insects, often of elegant forms and beautiful colors. They inhabit the most various situations; most of them either shelter themselves within the substance upon which they are feeding, or form themselves little cases, which they carry about with them. The majority feed upon green vegetable matter; many of these mine in the leaves and stems of plants, while others live upon the surface in small cases neatly made of a little piece of leaf. The most destructive species are those which live upon dry animal and vegetable matter, among which the well-known Cloth or Carpet Moths, *Tinea tapetzella*, and the Corn-Moth, *T. granella*, which attacks corn in granaries, are the most noted. Two species of *Galleria* live in bee-hives, to which they often do great damage.

ORDER 5. **DIPTERA.**

This, as the name imports, embraces the *Two-winged Flies*, and includes a larger number of species than any other order of insects. In these the head is generally of considerable size, and is furnished with a pair of large, compressed eyes, which occupy nearly its whole surface. The legs are well developed, the tarsi composed of five joints, terminated by a pair of claws; the abdominal rings are distinct.



FLIES.

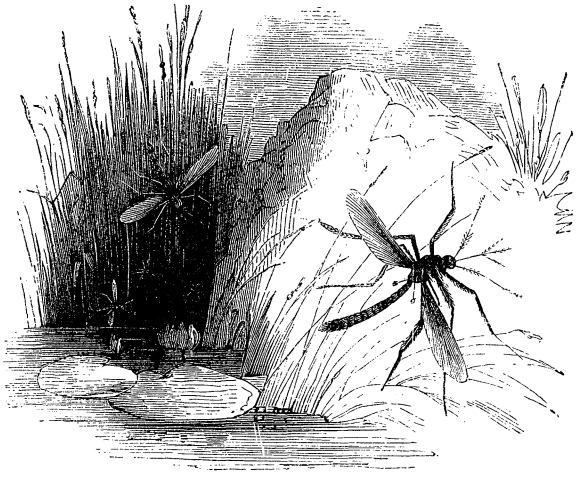
The larvæ of the Diptera are footless grubs or maggots, sometimes destitute of a distinct head; in some cases, on reaching maturity they cast their skins, and are changed to free, quiescent pupæ; while in many species this transformation takes place within the skin of the larva, which then hardens and forms a case for the sleeping infant. This vast order is divided and subdivided into numerous tribes and families; we shall only attempt to notice a few of the most conspicuous species.

THE CULICIDÆ.

In the family of the *Culicidæ*, or Gnats, which include several pre-eminently bloodthirsty species, the proboscis is especially suited for their work of torment. It is often half the length of the insect, slender, slightly thickened at the tip, and incloses six long, sharp bristles. These insects, their curious dances, and the very disagreeable effects of their bite, must be well known

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to every one; the MOSQUITOS, *Culex musquito*, which are very nearly allied to the gnats, are still greater pests. In some parts of America, and in India, the inhabitants are compelled to protect themselves when asleep, by means of fine gauze curtains, from the attacks of these bloodthirsty little creatures.

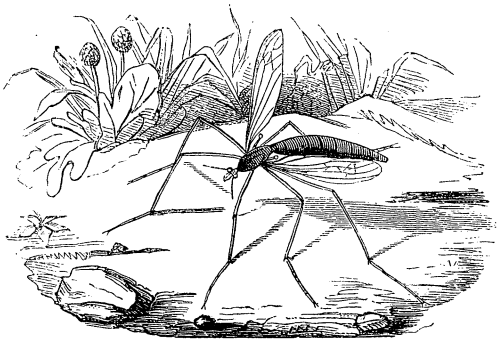


GNATS.

The female of the COMMON GNAT, *Culex pipiens*, lays her eggs, two hundred to three hundred in a year, one by one in the water; these are joined together, and form a little raft, which floats on the surface. They are hatched in three days, and in fifteen days the larvæ have reached maturity. They still inhabit the water, and are very active; when about to assume the imago state, the skin which covered the pupa being loosened from the animal within, and the space between the two being occupied with air, it floats upon the surface of the water; the gnat breaks through the upper part, and stands on the skin it has quitted, and which now serves as a little boat, upon which it floats until it has attained strength to fly. There are many species of gnats, some of which are harmless; others are not only troublesome to man, but to cattle, beasts, and birds, sucking their blood, and causing the most irritating pains and itchings in the skin. The mosquitos, of which there are several species, are hatched in nearly the same manner as the gnats.



MOSQUITOS.



THE MEADOW-TIPULE.

THE TIPULIDÆ.

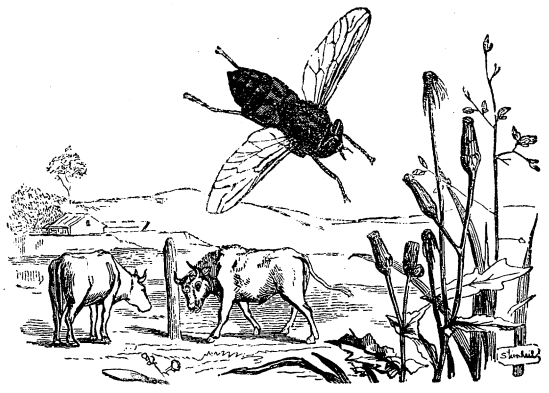
These have the proboscis short, terminated by a pair of fleshy lips, inclosing two bristles. The MEADOW-TIPULE of Europe, *Tipula oleracea*, is common in the blades of grass. The common *Tipulæ*, or DADDY LONG-LEGS, are well-known examples of this family. Their larvæ live in moist ground, and often do great mischief by eating the roots of grass in meadows. The HESSIAN-FLY, *Cecidomyia destructor*, is noted for its ravages among the wheat crops of this country. Its larvæ attack the stems of the plants near the ground, while those of the WHEAT-FLY, *C. tritici*, feed on the flowers, and render them abortive. The ravages of these insects, at particular seasons, have often caused damage to the amount of millions of dollars in a single year.

THE ŒSTRIDÆ.

This family includes the *Gad-Flies* and *Breeze* or *Bot Flies*, so troublesome to cattle and horses. The OX-FLY, *Œstrus bovis*, is three-fourths of an inch long, and lays its eggs in the

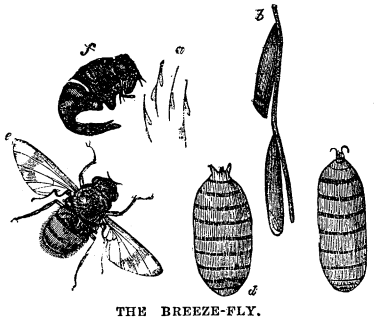
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skin of young cattle, producing a swelling which suppurates and forms a purulent humor, on which the larvæ feed. The SHEEP-FLY, *Œstrus ovis*, is less than half an inch long; it deposits its egg in the nostrils of the sheep; the larvæ ascend to the cavity of the forehead, where they remain for the season, often producing vertigo in their victims.



THE OX-FLY.

The BREEZE-FLY, or BOT-FLY, *Œstrus equi*, is distinguished from the other species by the smoothness of the thorax, and by the eyes in both sexes being equidistant from each other; it is not quite half an inch in length, with gauze-like yellow and brown wings; its chest is of a rusty color, approaching to a brown hue on the sides, and with a yellow tinge posteriorly; its belly is of a reddish-brown superiorly, and a dirty gray beneath, with its extremity almost black. The whole insect is thickly covered with down. In the latter part of the summer the impregnated female is seen very busy about horses, being now prepared to deposit her eggs. She approaches the horse, selects some part which he can reach with his tongue, and which he is in the frequent habit of licking; she balances herself for a moment, and then suddenly darting down, deposits an egg on one of the hairs, which adheres by a glutinous substance that surrounds it. She continues her labor with wonderful perseverance until she has parted with fifty or a hundred eggs, and then having exhausted herself, she slowly flies away, or drops at once and dies. These eggs, taken into the stomach of the horse, are hatched, the larvæ being an inch long. These pass through the whole length of the intestines, and are voided with the excrement. They now dig into the earth, enter into the pupa state, and after lying dormant for a time, burst from their prison, mount on their wings, and seek their mates. Of the *Horse-Fly*, genus *Tabanus*, we have three noted species, the *Black*, *Belted*, and *Lined*, with others, smaller and less notorious.



THE BREEZE-FLY.

a, eggs of Breeze-Fly; *b*, the same magnified; *c*, larva, or bot; *d*, chrysalis; *e*, perfect insect; *f*, female depositing her eggs.

THE MUSCIDÆ.

This family includes an immense number of insects, twelve hundred species having been, it is said, described by a naturalist in Europe. Of these the COMMON HOUSE-FLY, *Musca domestica*, furnishes a familiar example. In the larva condition, some of them live in dung; some, as the FLESH-FLY, *M. vomitoria*, often called *Meat-Fly*, feed upon animal substances. The CHEESE-HOPPER, *Piophila casei*, makes considerable leaps by bending its body into a loop and then suddenly straightening it. Many of these larvæ, which feed upon animal substances in a state of decomposition, must be included among our greatest benefactors, as, by removing in a short space of time, matters which, if left, would corrupt and fill the atmosphere with noxious vapors, they prevent all the ill effects which these effluvia are known to produce upon animal life. So rapidly do they perform this business, that Linnæus calculated that the progeny of three Flesh-Flies would devour the carcass of a horse almost as quickly as a lion.

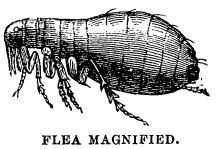
The larvæ are soft footless grubs, frequently destitute of any distinct head. They are generally produced from eggs laid by the parent in the midst of substances suited to their nourishment. The habits of the perfect insects are various; many attack men and animals and seek their blood; some live on the juices of flowers; some inhabit filthy water and other foul liquids; they are endowed with a telescopic tail, through which they breathe by putting it to the surface while they are immersed in the water.

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THE HIPPOBOSCIDÆ.

These include the FOREST FLIES, which attack various animals and suck their blood, producing the greatest irritation. The *Hippobosca equina* is exceedingly troublesome to horses: the *Nycteribiidæ* confine their depredations to bats. Some species infest young birds and nearly drive them to distraction.

ORDER 6. **APHANIPTERA.**



FLEA MAGNIFIED.

This includes the FLEAS, which, despite their minuteness, have made themselves a name in the world. The arterial covering is a horny compound of very distinct segments; the wings are four, but nearly rudimentary; the suctional organs consist of a pair of fine, serrated, sword-shaped mandibles, provided with a sharp, needle-like spear for penetrating the skin of the victim. The larva of the COMMON FLEA, *Pulex irritans*, is a long footless grub, with a horny head; it is hatched from eggs laid by the female, generally in the neighborhood of animal matter. The larvæ are active, and when they attach themselves to dogs or other animals they twist about among the hairs or feathers, feeding upon minute particles of animal matter. In about twelve days they are full grown. They then inclose themselves in a silky cocoon, and pass to the pupa state. In this condition the insect is quiescent, inclosed in a skin which fits over all parts of the body. The perfect insect emerges in about a fortnight. Most of the species of Fleas, or *Pulicidæ*, are parasitic upon particular animals—one of the largest being found upon the mole.*

A minute species, inhabiting the West Indies and South America, the CHIGOE or JIGGER, *P. penetrans*, is remarkable for the habit possessed by the female of inserting herself beneath the skin of the foot, generally under the skin of the nails. In this situation her abdomen swells to about the size of a small pea, in consequence of the development of eggs in the ovaries, occasioning great pain and irritation of the part, and if not extracted in time the eggs are said to be hatched within the wound, producing extensive ulceration, and sometimes even causing death. The feet of dogs are also attacked by this pest; and it is said that the unfortunate creatures may often be seen rolling about and nibbling their toes in a state of the greatest agony.

ORDER 7. **NEUROPTERA.**

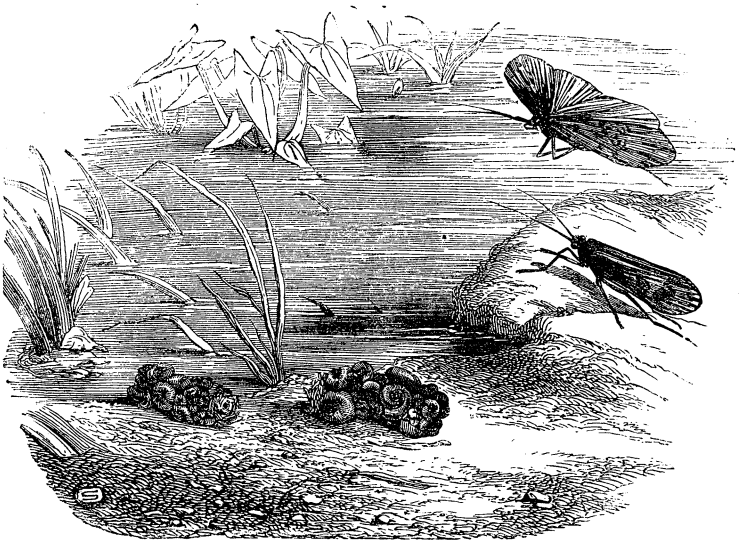
This division includes a large number of very remarkable species called *Nerve-winged Insects*—the name of the order being derived from the Greek *neuron*, a nerve, and *ptera*, wings.

THE PHRYGANEIDÆ.

These insects are noted for their complete metamorphosis; the larvæ are aquatic, being long, softish grubs with six feet, defending themselves from fishes and other animals, by casing their bodies with straw, sticks, pebbles, and shells. Before passing to the pupa state, the larva fixes its case to some object in the water, then closes up the two extremities with a silken grating, through

* Most of our readers are doubtless acquainted with the fact that fleas have often been trained to perform various curious tricks, such as firing cannon, driving coaches, playing on the piano, &c.—all these articles being of proportions adapted to the minuteness of the operators. These are called INDUSTRIOUS FLEAS, or INTELLECTUAL FLEAS, and exhibitions of them have often taken place in the great cities of Europe and America. The following curious anecdote connected with one of these performances is furnished by a correspondent of the *London Times*: "The sovereign of one of the German States commanded the attendance at court of one of these exhibitions, and the performance of the fleas—some harnessed like horses, and others dressed to represent celebrated human characters—commenced. But soon the exhibitor became perturbed, looking hither and thither, searched through his repository, and stopped the performance with an apology that one of his chief performers, his Napoleon, had escaped, although he was safe when the acting began. 'Where can he be gone?' said the king. The exhibitor looked uneasy but spoke not. 'Tell me,' said his majesty, interpreting his increasing confusion, 'what you suspect.' 'If I may be so bold, your majesty, I believe he has taken refuge with the Princess H———.' 'Then,' said the king, 'search shall be made;' and the princess retired. After a while, she appeared with a captive, who was immediately put upon the stage. But, oh horror! the exhibitor exclaimed—'He is not my Napoleon; he is a wild one!'"

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THE PHRYGANIA STRIATA AND ITS LARVÆ; CADDICE-WORMS.

which the water, necessary for the respiration of the pupa, can easily pass. The pupa is furnished with a pair of hooked jaws, by means of which, when about to assume the perfect state, it bites through the grating of its prison, and thus sets itself free in the water. In this form the pupæ of some species swim freely through the water by means of their long hind-legs, also creeping upon the other four limbs; they frequently rise to the surface of the water, and there undergo their final change, using their deserted skin as a sort of raft from which to rise into the air, while others generally creep up the stems of aquatic plants for the same purpose.

The perfect insects have four wings, with branched nervures, of which the anterior pair are clothed with hairs; the posterior pair are folded in repose. The head is furnished with a pair of large eyes, and with three ocelli, and the antennæ are generally very long. The females have been observed to descend to the depth of a foot or more in water, in order to deposit their eggs. The *P. striata* is over an inch long, of a fawn-color, with the exception of the eyes, which are black.

Many species of Phryganeidæ are found in Europe, and also in America. The larvæ are well known to anglers under the names of *Caddice-Worms* and *Straw-Worms*. They are said to be excellent fish-baits.



THE ANT-LION AND ITS LARVA.

THE PANORPIDÆ.

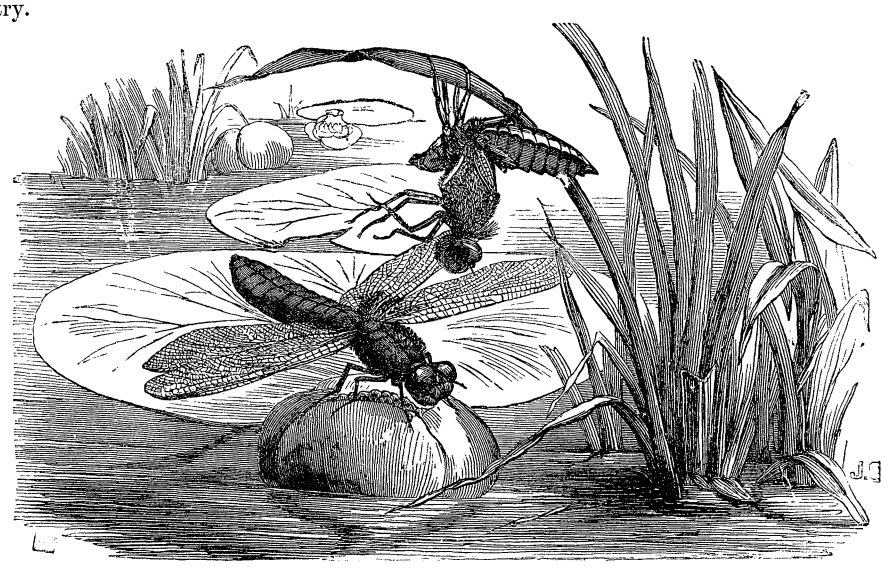
This includes the Scorpion-Fly, *Panorpa communis*, a small-sized insect commonly found about hedges in damp situations. In England they are called *Snake-Flies*.

THE MYRMELEONTIDÆ.

These insects, called Ant-Lions, include several genera, which pass their lives chiefly in the air when in the perfect state, In some species the larvæ, which are small, sluggish, oval-shaped creatures, and furnished with a formidable pair of jaws, excavate conical pits in the sandy places which they inhabit, at the bottom of which they conceal themselves entirely, with the exception of the head and jaws. Here they

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wait patiently until some prying ant or other insect unwarily strays into their domain, when the unfortunate intruder generally slips to the bottom of the pit, and is soon destroyed by the merciless jaws of the Ant-Lion; but if the victim shows any intention of making its escape, a shower of sand thrown up by the former arrests his progress, and generally brings him down to the fangs of the destroyer. It is entirely by sucking the juices of its victims that this voracious little creature exists; and when these are exhausted, the carcass is immediately thrown out of the pit by a sudden jerk of the jaws. The larvæ of other species appear to prowl about, upon and under the surface of the ground, without making pitfalls. Some of these insects are common in our country.



THE ELEANOR DRAGON-FLY.

THE LIBELLULIDÆ.

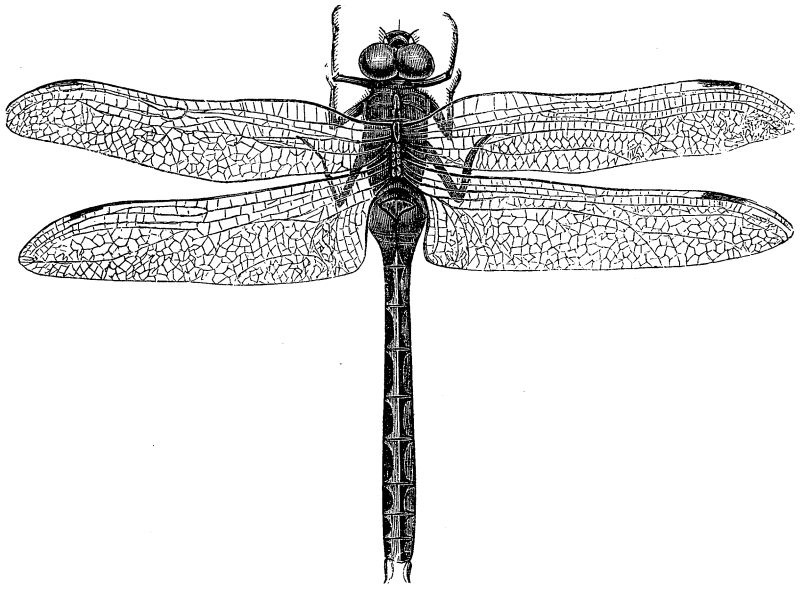
These are distinguished by their four large, nearly equal, reticulated wings, by the powerful structure of their mouths, and the shortness of the caudal appendages, which moreover are not jointed. The antennæ are composed of from five to eight joints; the eyes are very large, generally meeting on the top of the head, which also bears three ocelli. They are exceedingly elegant but voracious insects, which may be seen in fine summer weather, hawking about over the surface of ponds and rivers in search of insect prey. They are well known in Europe as *Dragon-Flies;* the French call them *Demoiselles*, probably in allusion to the elegance of their forms and the grace of their movements. The vulgar English name of *Horse-Stingers* is inappropriate, as these insects possess no means of annoying either horses or any other of the larger animals. The larvæ and pupæ of the Libellulidæ inhabit the water, from which the pupa emerges when the perfect insect is ready to commence its aerial existence. The empty pupa skin may often be seen attached to aquatic plants.



THE VIRGIN DRAGON-FLY.

One of the most beautiful species of Europe is the VIRGIN DRAGON-FLY, *Libellula virgo*, which is not uncommon on the banks of rivers.

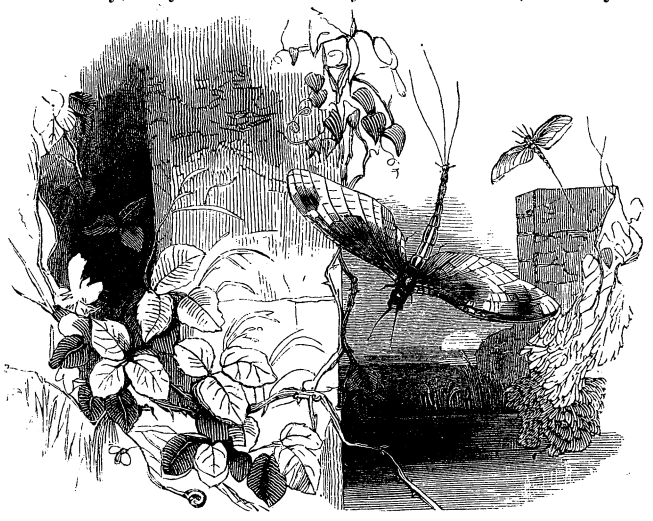
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AMERICAN DRAGON-FLY OR ÆSHNA.

It is of a deep steel-blue color, and the wings have a large dark patch near the apex. Some of the Dragon-Flies have the abdomen at least six inches long. Among the larger kinds is the *Libellula depressa* of Linnæus, common in Europe, and popularly called *Eleanor;* the abdomen is large, short, and flat, and composed of nine rings or segments; the wings are diaphanous, and the flight is exceedingly light.

The Dragon-Flies, of various sizes, are numerous in this country, and are commonly called *Devil's Darning-Needles*, and sometimes *Spinners*. They are often seen moving with a rapid flight over rivers, ponds, and meadows, alighting for a moment, and then shooting away again. They are beautifully colored, and have a peculiarly light and airy appearance. They are, however, exceedingly voracious, being among insects what hawks and eagles are among birds. But although formidable to the minute creatures of their own class, they are perfectly harmless to man. Nay, they are in fact very useful to him, as they destroy a vast number of gnats and other insects which are troublesome or destructive. If a few dragon-flies be shut up in a house for a short time they will exterminate the mosquitos, flies, and other vexatious blood-suckers of the kind, just as a few toads put into a room will rid it of bed-bugs, cockroaches, and the like.



MAY-FLIES.

THE EPHEMERIDÆ.

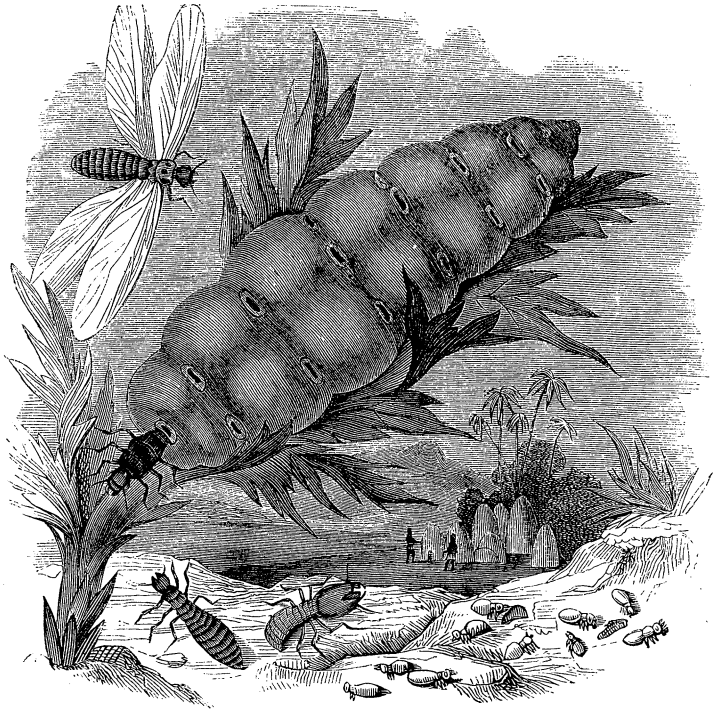
These insects are called *Day-Flies* from the shortness of their existence in the perfect state; they are also called *May-Flies*. Both larvæ and pupæ present a considerable resemblance to the perfect insect; but the entire period of the preparatory stages is passed in the water. During this period the larvæ and pupæ make themselves little burrows in the sides of

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the pond or stream in which they live, and these burrows have two openings, so that if the insect enters by one it can pass out by the other without the necessity of turning round in its narrow domicile. On arriving at maturity the pupæ come out of the water, when the perfect insect emerges from its case and takes to flight. It is still, however, inclosed in a very delicate pellicle, to get rid of which it soon attaches itself by its claws to any object that may be at hand, and after a few struggles leaves this encumbrance behind it, and flies away. After this last change the insect exhibits its brightest colors, and the tails grow to twice their previous length. The emerging of these insects from the water appears always to take place in the evening, and as the whole of the Ephemeridæ in a river appear to arrive at maturity at the same period, they generally make their appearance in such countless swarms, for two or three evenings, that the effect produced by one species with white wings has been compared to a heavy fall of snow. By the next morning the majority of these insects are found lying dead upon the shore in heaps. The occurrence of these swarms of May-flies has been observed in different parts of Europe, in Holland, France, and Switzerland; and it appears that the species found in each of these localities is distinct from the rest. In Switzerland, indeed, the swarms of two species are on record, one inhabiting the Lake of Geneva, and the other the Rhine, near Basle. The common European species, *Ephemera vulgata*, also occurs in profusion for a few days in the rivers frequented by it, but not by any means to the same extent as the species just referred to. This and several other species of the family are favorite baits for trout. We have several species in this country, *May-Flies* being their common name.

THE PSOCIDÆ.

This is a family of very minute insects, one species of which, the *Atropos pulsatorius*, is called *Death-Watch*, on account of its producing a sound like the ticking of a watch.



WHITE ANTS.

THE TERMITIDÆ.

These animals, often called *White Ants*, live in vast communities, principally in the hotter regions of the earth, where they do incredible damage by devouring almost every thing that

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comes in their way. Even solid wood is incapable of resisting their ravages, for they will gnaw away the interior of beams and articles of furniture, leaving a thin shell to conceal their operations, so that the mischief is not discovered until, from its weakness, the object falls to pieces on being touched. According to Latreille these insects consist of five classes of individuals. Of these, two are undoubtedly males and females, which at first appear to be exactly similar, and are furnished with four nearly equal wings. After impregnation the abdomen of the female increases vastly in size, from the immense number of eggs contained, which are so numerous that it is said as many as eighty thousand are sometimes laid by one female in the course of twenty-four hours. The great bulk of the community is composed of apterous individuals, supposed to be larvæ, which closely resemble the winged insects, but are destitute of eyes and ocelli. These are the *Workers*, and upon them all the labor of the community devolves. Other apterous individuals, apparently pupæ, resemble the workers, but have four tubercular wing-cases on the thorax; while others, distinguished by the large size of their jaws, and which appear to be neuters, are called *Soldiers*, their office, apparently, being the defense of the community against the assaults of enemies. The habitations raised by these diminutive creatures are among the most surprising of insect edifices. They are usually built upon the ground, but sometimes among the branches of trees, whence they communicate with the ground by a long gallery, twining round the branches and trunk of the tree. Those built on the ground are of various forms, though the most common shape is that of an irregular cone. These nests are frequently ten or twelve feet in height, built of earthy particles, which the workers masticate, and then apply to this purpose. They speedily dry, and become very hard. The nest is divided internally into numerous chambers and galleries, in one of which the female or queen is imprisoned, waited upon obsequiously by a numerous train of attendants, whose apartments are in the immediate vicinity of the royal chamber. These attendants carry off the eggs, as soon as laid, into separate chambers or nurseries, where the young produced from them are tended with the greatest care by the workers. The interior of the nest forms a large dome, with thick wall, within which there are usually two or three roofs; the walls are perforated by passages leading from the bottom of the nest to the magazines and nurseries placed in its sides, which also frequently communicate with the ground-floor by small earthen bridges.

Other species, although differing in details, follow the same general principles in the construction of their nests.

ORDER 8. **ORTHOPTERA.**

This word is from the Greek *orthos*, straight, and *ptera*, wings, and hence these are called *Straight-winged Insects*. The order includes a great number of familiar species, most of which we must treat very briefly.

THE FORFICULINA.

This includes the Earwig, *Forficula*, which appears to live principally upon vegetable substances. As this tribe often attack the petals of flowers, they are regarded as enemies by the gardener. They are nocturnal in their habits, creeping into crevices at the approach of day. It is this instinct that prompts them to take shelter in the flower-pots and other hollow objects usually placed as traps among the flowers which are subject to their ravages. It appears to be a common belief almost everywhere that the Earwig creeps into the ears of persons sleeping in the open air, passes thence into the brain, and causes death. Ridiculous as this fancy is, it appears to have furnished the name for the Earwig in almost all languages. The female usually scoops out a hollow in the earth, in which she lays a small mass of eggs; these she watches over with great assiduity until they are hatched, when she continues to display the same affection for the new-born young.

THE BLATTINA.

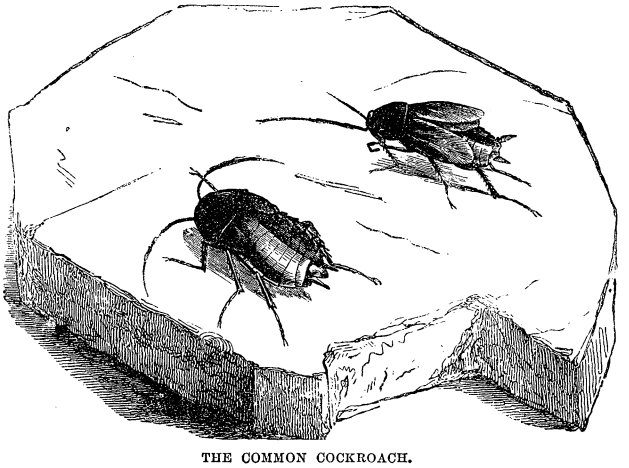
This includes the *Cockroaches*, the most noted species of which, the Black Beetle or Common Cockroach, *Blatta Orientalis*, often swarms to such an extent in houses as to be a com-

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plete nuisance. Though now so common all over Europe and America, they are supposed to have been originally natives of India, and to have been gradually carried westward by the progress of commerce. This and another species, the *B. Americana*, are very common on board ships, where they find plentiful nourishment among the merchandise, and on shore they are usually most abundant in seaport towns. They are all nocturnal in their habits, concealing themselves in dark holes during the day, but coming out of their hiding-places when the lights are extinguished. On the introduction of a light into the scene of their nocturnal prowlings, they may be seen hurrying away in great disorder toward the nearest place of concealment. The common Cockroach, and some allied species, appear to have the faculty of devouring every thing that comes in their way, whether of an animal or vegetable nature; and when they occur in great numbers, the damage they do to provisions and many other articles is excessive. They also usually communicate a disagreeable smell to objects which they have touched, so that they often spoil more than they actually consume. A large species, *Blatta gigantea*, common in the West Indies, is there known by the name of the *Drummer*, from its curious habit of making a knocking noise during the night. This noise is frequently kept up all night, the insects alternately answering each other, to the great annoyance of those living in the house thus infested. This species is also said occasionally to attack people when asleep, and, as if its other habits were not sufficient to create a prejudice against it, it sometimes devours the extremities of the dead.



EARWIGS.



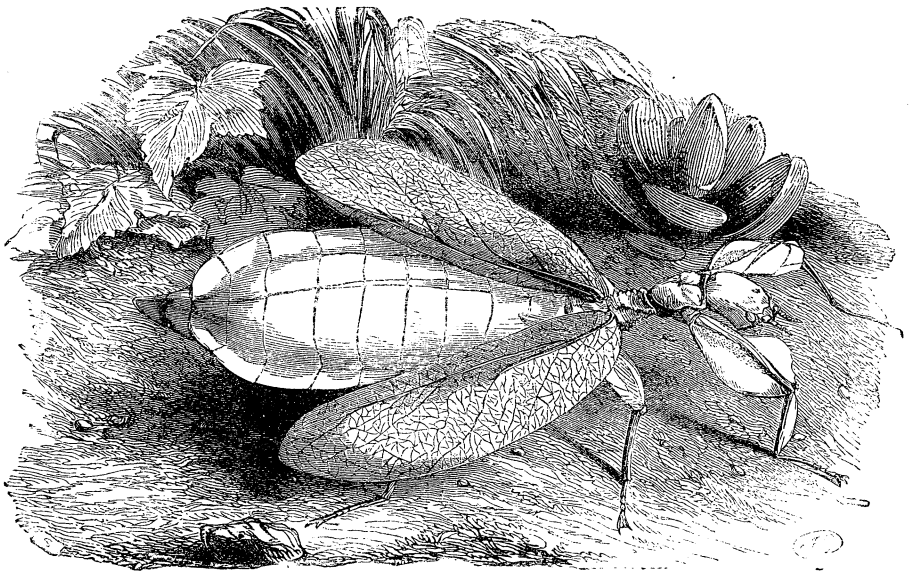
THE COMMON COCKROACH.

THE MANTINA.

These insects principally inhabit warm countries, and from their habits have acquired great celebrity. Carrying their long fore-legs, armed with formidable spines, aloft in the air, they creep slowly along, and their whole attitude is so solemn that they are regarded with veneration by the inhabitants of the countries in which they occur. In the south of Europe they are called *Praying-Beetles* (see p. 597), or by names indicative of the belief that their singular attitude is one of prayer. According to ancient legends this creature has not always confined itself to silent devotion; for we are told that one of them, on being desired by St. Francis Xavier to sing the praises of God, immediately chanted a beautiful canticle. Another prevalent superstition regarding these creatures is, that if they be asked the way to a place they immediately indicate the right road by holding one of their legs in that direction—hence the name of *Soothsayers* often applied to these insects, and the Greek word *Mantis* has the same signification. Unfortunately, however, all these amiable qualities are purely imaginary. The Mantis is one of the most voracious of its class, and only assumes this solemn and devout appearance for the beguilement of its unsuspecting victims: it is also exceedingly quarrelsome. We have no large species of mantis among us, but smaller ones are occasionally met with.

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The warlike disposition of the Mantis is put to a curious use in China, these insects being kept in bamboo cages for prize-fights, like fighting-cocks. At these exhibitions two of them are placed face to face; they raise their wings, their bodies tremble, and with the utmost fury they rush upon each other. They use their long fore-legs like sabers, giving blow upon blow; sometimes the fight lasts several minutes. The victor then devours his enemy, which, all things considered, is a much more rational termination of a duel than is common among men. Were it introduced into the human code of honor, and the victor required to eat his victim, it would greatly tend to do away with one of our fashionable barbarisms.

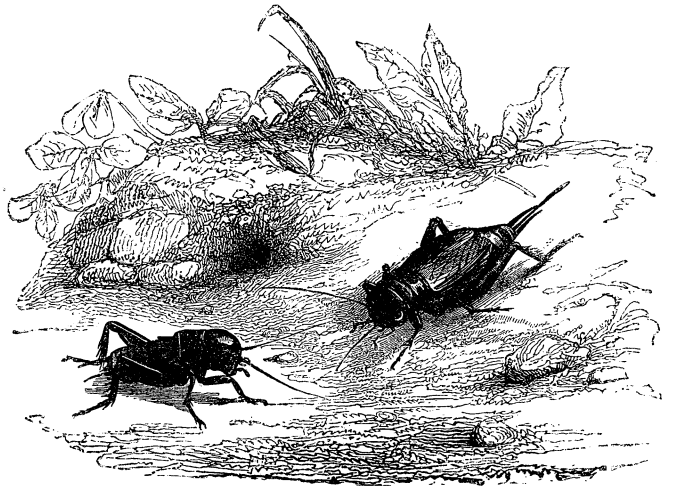


THE WALKING-LEAF.

THE PHASMINA.

This tribe includes some curious insects, one species of which is the WALKING-LEAF, *Phyllium siccifolium*, in which the body is flat and thin, and the wings form large, leaf-like organs, covering the whole abdomen, and furnished with regularly reticulated nervures, which give them exactly the appearance of a leaf. This leafy structure pervades the whole animal; the legs, especially the thighs, being always foliaceous. There are several other species in this country and in Europe.

In the WALKING-STICK, *Phasma baculus*, the body is much elongated, cylindrical, and usually of a dingy brownish color, so as closely to resemble the dried twig of a tree. This singular insect is quite common in Europe. One species, the *Spectrum femoratum*, is frequently seen in the Southern States, and is occasionally found in parts of New York and New England.



THE FIELD-CRICKET.

THE ACHETINA.

Of this tribe the COMMON CRICKET, *Acheta domestica*, the noisy little denizen of the kitchen-hearth, may serve as an example. During the colder months these insects seek the habitations of

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man, when they establish themselves in the neighborhood of the fire-place, in some room on the ground floor, generally preferring the kitchen, where their monotonous chirping may generally be heard in the winter evenings. In summer, however, they remove their quarters to the open air, taking up their abode apparently in the crevices of garden walls and similar situations. In fine summer evenings they sing most pertinaciously in the open air. Their food, when in the house, consists of crumbs of bread and similar household refuse, which are generally to be found in abundance on the kitchen hearth. They come into the houses about the end of August, probably to breed, as minute larvæ, not more than a line in length, may often be seen later in the autumn swarming about hearths inhabited by these insects.

Another species is the FIELD-CRICKET, *A. campestris*, a timid animal which avoids the society of man, living all the year round in the burrows which it forms in sandy banks among stones. This is much larger and louder in its song than the domestic species, but it is by no means so common, frequenting only hot sandy districts.

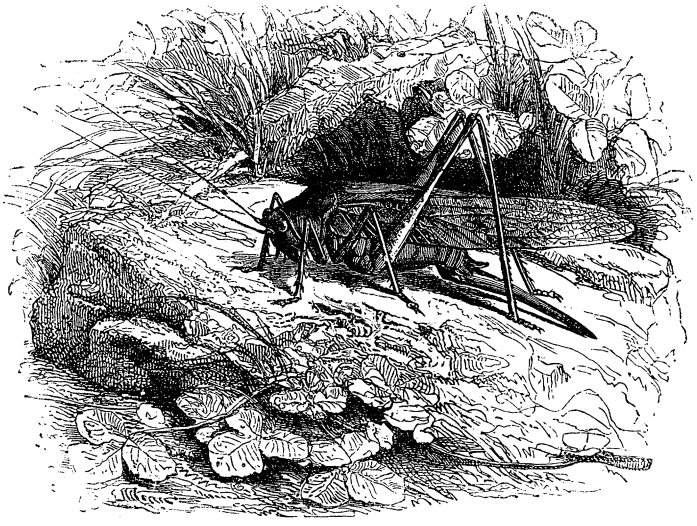


THE MOLE-CRICKET.

A still more remarkable insect belonging to this tribe, is the MOLE-CRICKET, *Gryllotalpa vulgaris*, which, both in its structure and habits, presents no inconsiderable resemblance to the mole. Like that animal it is constantly engaged in burrowing in the earth; and to enable it to do this with facility its anterior limbs are converted into a pair of flat, fossorial organs, which are turned outward in exactly the same manner as the hand of the mole. In its passage through the earth it does great injury to the roots of plants, but it is said to live quite as much upon animal as vegetable food.

THE GRYLLINA.

This tribe includes the *Grasshoppers*, of which there are many species in most countries. The CAROLINA GRASSHOPPER, *Gryllus Carolina*, is a large species with brown wings, common in our grassy fields in August, September, and October; they rise when approached and fly for the distance of a few feet, when they alight. There are many other species, many of which are only able to leap, without the power of flight. The *Gryllus dux* of South America has wings of an expanse of twelve inches, beautifully illuminated with red and blue colors, with black spots.



THE CAROLINA GRASSHOPPER.

The KATYDID, *Platyphyllum concavum*, is one of the most noted of our grasshoppers, on account of its familiar song in the early autumn evenings, consisting of a continued cry of *Katy-*

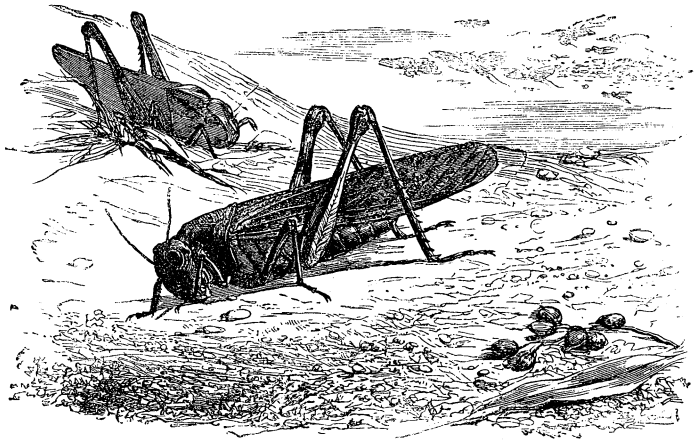
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did, Katydid, with an occasional reply of *Katy didn't, Katy didn't.* This species is an inch and a half long, with wings of a pale-greenish color. The song is produced by the rubbing together of the hard glassy membranes at the base of each of the wing covers, with a saw-like motion. The songs of other grasshoppers are produced in a similar manner. There are numerous other species of this family in our country.

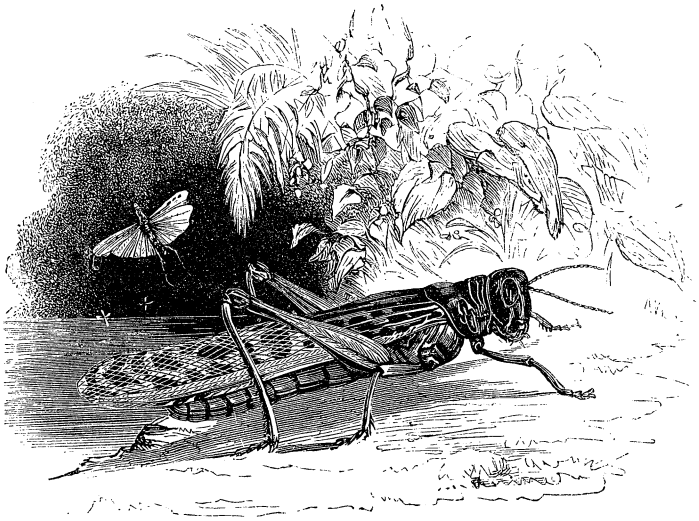
THE LOCUSTINA.

These insects resemble some of the grasshoppers, but they may be distinguished from them by the antennæ, which are short, stout, and cylindrical, while those of the true grasshoppers are very long, slender, and tapering to a fine point.

In the *Locustina* the tarsi are three-jointed, and the females have no apparent ovipositor. The head is usually furnished with three ocelli. Few insects are more dreaded by the inhabitants of the warmer regions of the earth than these Locusts, which, from their often collecting in vast swarms, and moving onward with a steady and irresistible progress, quickly destroy every trace of vegetation over a vast extent of country, thus reducing the husbandman to despair, and converting the smiling face of nature into a desolate wilderness. It was this insect, which was sent as one of the plagues of Egypt; (Exodus, chap. x.) A district over which one of these devastating swarms has passed is said to appear, to the eye of an observer, as though every vegetable production which once decked its surface had been completely burned off the ground; hence the Latin name of the insect, *Locusta*, from *locus ustus*, a burnt place, is peculiarly appropriate. Eastern countries, and especially those in the neighborhood of the Levant, appear to be most exposed to the ravages of these destructive insects; and we find many highly poetical references to them in the writings of the Hebrew prophets, wherein this appearance of burning is expressly mentioned. When the vegetation of the place first devastated by these creatures is entirely destroyed, they take to flight in boundless multitudes to some other devoted spot, often forming clouds of several hundred yards across, which, in their passage, sometimes conceal the light of the sun. When engaged in the work of destruction, they are said to produce a sound resembling that of a strong flame driven by the wind, and the spot upon which they have alighted is almost immediately denuded of every thing green. The descent



LOCUSTS.



THE LOCUSTA CRISTATA.

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of a hostile army is less dreaded in the countries subject to these visitations, than the appearance of the hosts of the locusts, which were regarded by the ancients, both Jews and Pagans, and still are by the Arabs, as the avenging armies of the Deity. The modern Arabs, in fact, declare that the locust bears a statement to this effect, in good Arabic, in the markings on its wings. The best known species is the *Locusta migratoria*, which has occasionally found its way into Central Europe; but in the south of Europe this insect is a formidable enemy to agriculture, and a considerable amount is there annually paid in rewards for its destruction.

The inhabitants both of Asia and Africa, where locusts particularly abound, use these animals as a common article of food. They generally pull off the legs and wings, and fry the bodies in oil or butter, and a dish of locusts well prepared is said to be regarded as somewhat of a delicacy in those countries. The locusts are also occasionally dried, pounded, and used as flour; even cattle and horses are fed on them where they are abundant. The migratory locust measures about two inches and a half in length, and some other exotic species are much larger; the *Locusta cristata*, a very beautiful species, common in the Levant, being four inches long, and between seven and eight in expanse of wings. The common European species are generally of comparatively small size. Nearly all of them produce a loud chirping noise, by rubbing the inside of the thigh against the elevated nervures of the wing-covers; but beyond this they possess no special apparatus for the production of sound.

Among the American locusts are the Carolina Locust, *L. Carolina*, one inch and a half long; the *L. corallina*, *L. sulphurea*, and *L. nebulosa*.

ORDER 9. **PHYSOPODA.**

These insects, which derive their name from the Greek *phusa*, a bladder, and *pous*, a foot, are found upon most plants, generally in the flowers, which they appear to visit in search of the sweet fluid to be found in such situations. They run quickly, and often perform considerable leaps by the assistance of the abdomen. Many of them, not content with such light nourishment as the nectar of flowers, inhabit the foliage and stems of plants, to which they often do a great deal of mischief. One species, the *Thrips cerealium*, has frequently done considerable damage to the wheat crops in Europe, and a similar species has been frequently mischievous in this country. It sometimes attacks the grain in the ear, often gnawing the tender stems. Others are found upon and under the bark of trees.

ORDER 10. **RHYNCHOTA.**

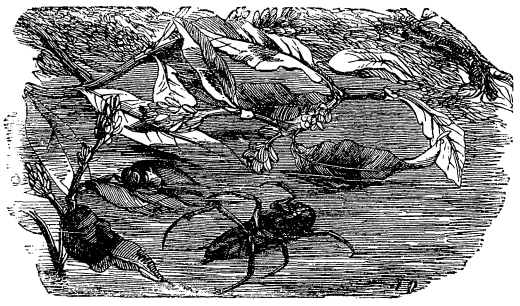
The order *Rhynchota*, corresponding with the *Hemiptera* of Latreille, is distinguished from the other insects with an imperfect metamorphosis by the possession of a suctorial mouth. This consists of a more or less flexible jointed rostrum, composed of the labial palpi, which forms a sheath within which four bristles, the analogues of the mandibles and maxillæ, are contained and protected from injury. By means of these bristles the insect wounds the plants or animals upon the juices of which it feeds, and the fluid nutriment is then sucked up by the action of an inflated appendage of the œsophagus. The head always bears a pair of compound eyes, and usually either two or three ocelli. Most of the species possess four wings, which vary considerably in their structure. The order may be divided into two sub-orders, the *Heteroptera* and the *Homoptera*.

THE HETEROPTERA.

This term is from the Greek *heteros*, dissimilar, and *ptera*, wings, and includes two principal groups, the Hydrocores, *Water-Bugs*, and the Geocores, *Land-Bugs*. The former are at once recognizable by the small size of their antennæ, which are composed of three or four short joints, and concealed beneath the eyes. Of these, the *Notonectida* are distinguished by their broad, rounded head, which occupies the whole width of the front of the body. They swim rapidly about in the water, with their bellies directed upward, rowing themselves along by means of their flattened

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hinder legs, which are extended on each side of them like oars. Hence the NOTONECTA, *N. glauca*, is generally known as the *Boat-Fly*. They carry the air required for their respiration in a space left for this purpose between the wings and the back. They are very active and predaceous animals, and when captured, some of them often inflict a painful wound with their powerful rostrum. Several species may be met with in almost any piece of water. In this country they are called *Back-Swimmers*.



THE BOAT-FLY.

In another family, the *Nepina*, the head is small and triangular, and generally considerably narrower than the thorax. Their legs are generally less distinctly formed for swimming than in the preceding group, but the anterior pair are converted into powerful raptorial organs; the Nepina, although much slower in their movements, being quite as predaceous in their habits as the Notonectida. The *Nepa cinerea* is a European example of this family, which may be met with there in every pond. We have several species in this country.



THE NEPA CINEREA.

In the *Geocores*, or *Land-Bugs*, for which Mr. Westwood has proposed the name of *Aurocores*, *Air-Bugs*, as more appropriate, some of the species inhabiting the surface of the water, the antennæ are never concealed, and the legs are always formed for running. When disturbed or irritated, most of them emit a most offensive odor. These insects form nine principal groups, of which the first four have the rostrum of three joints, while in the remainder this organ is composed of four articulations. The species with a three-jointed rostrum are for the most part predaceous in their habits, while those with four joints generally feed upon vegetable juices. To the Geocores belongs the BED-BUG, *Cimex lectularius*, which is said, though without sufficient authority, to have been introduced from America into Europe, in timber. The SQUASH-BUG, *Coreus tristis*, well known for its disgusting odor, and its destruction of pumpkin and squash vines, is a near relative, as it should be, of the bed-bug.

The *Scutata* include some brilliant insects, but those best known in our country belong to the genus *Pentaloma*, which are found on berry-bushes and strawberry-vines, and often impart their offensive smell to the fruit. The *Callideæ* of hot climates rival the butterflies in their brilliant golden-green, spotted with black.

THE HOMOPTERA.

The Homoptera form three great groups or tribes—the *Coccina*, *Phytophthiria*, and *Cicadaria*—composed of numerous insects, the history of some of which is still very imperfectly known.

THE COCCINA.

Of these the tarsi have only one joint. The males are furnished with two wings with a few straight nervures; they are destitute of a rostrum, and pass their pupa stage in a state of repose. The females are destitute of wings, possess a rostrum, and appear to undergo no metamorphosis whatever. Of these insects there are several species, some of which are of great commercial importance. The finest red dyes known to our manufacturers are derived from these creatures. The *Lecanium ilicis*, which inhabits the *ilex*, or ever-green oak of the countries round the Mediterranean, was employed for this purpose by the ancient Greeks and Romans, as it is still by the Arabs; and until the introduction of the Mexican cochineal, another species, the *Porphyrophora Polonica*, which lives on the roots of the *Scleranthus perennis* in Central Europe, was much used

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for the same purpose. The MEXICAN COCHINEAL, *Coccus cacti*, which has driven the others out of the field, is also a species belonging to this group. It lives as a parasite upon the Nopal, or *Cactus opuntia*—a plant very common in Central America. The commercial importance of this insect is shown by the fact, that in 1850 no less than two million five hundred and fourteen thousand five hundred and twelve pounds of cochineal were imported into Great Britain alone; and as about seventy thousand insects are supposed to be contained in a pound of this substance, we may form some idea of the numbers annually destroyed. For many years the cultivation of cochineal was entirely confined to Mexico; but the insect has lately been introduced into Spain and the French possessions in Africa, with some prospect of success.

A fourth species, of great importance, is the LAC INSECT, *C. lacca*, an inhabitant of the East Indies, where it feeds upon the Banyan-tree, *Ficus religiosa*, and some other trees. To this insect we are indebted, not only for the dye-stuffs known as *lac-dye* and *lac-lake*, but also for the well-known substance called *shell-lac*, so much used in the preparation of sealing-wax and varnishes. In all these cases it is only the female insects that yield the coloring matter.

THE PHYTOPHTHIRIA.

The greater part of this tribe is composed of *Aphides* or *Plant-Lice*, whose extraordinary history renders them one of the most interesting groups of insects. They are all small animals, with a more or less flask-shaped body, furnished with six feet and a pair of antennæ, and usually with a pair of short tubes close to the extremity of the abdomen, from which a clear sweet secretion exudes. Both sexes are sometimes winged, sometimes apterous; and the individuals of the same species are often winged and apterous at different periods of the year. They all live upon plants, the juice of which they suck; and when they occur in great numbers, often cause great damage to vegetation. Gardeners and farmers are well aware of this. Many plants are liable to be attacked by vast swarms of Aphides, when their leaves curl up; they grow sickly, and their produce is certain to be greatly reduced. One striking instance is presented by the HOP-FLY, *Aphis humuli*, which in England alone has often done damage to the hops to the extent of millions of dollars, in a single year.

The sweet fluid which exudes from the tubular process of the abdomen of these insects is often in such abundance that it drops upon the leaves of the plants frequented by them, and even to the ground. It is well known by the name of *honey-dew*. Ants have a particular fondness for this fluid, and may constantly be seen upon trees and plants frequented by Aphides, stroking them with their antennæ, apparently to induce them to furnish a supply of the coveted fluid. From this circumstance the Aphides have been termed the *Ant's Milch-Cows;* and they are said to tend them with as much care as would be bestowed by a human farmer upon his cattle. Wasps also have been observed similarly engaged. The manner of propagation of these insects, which we have noticed in our Introduction to this Class, p. 539, is extremely curious, and has been the subject of immense research on the part of naturalists.

THE CICADARIA.

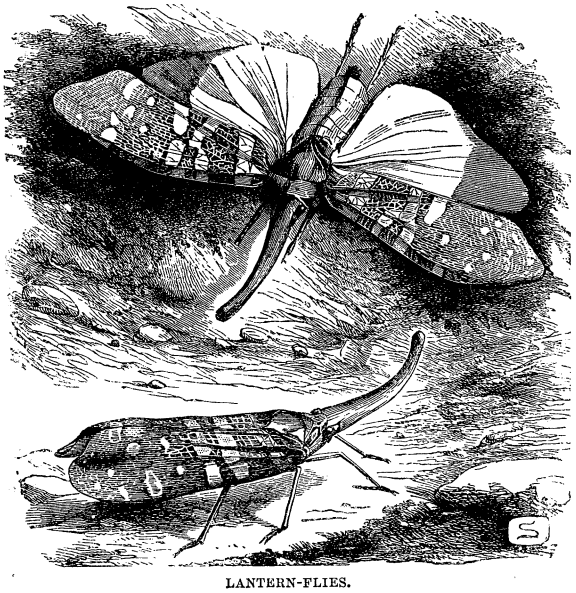
Nearly allied to the plant-lice are the *Cicadaria*, which include a great variety of insects, of which the COMMON FROG-HOPPER of Europe, *Aphrophora spumaria*, is an example. This is a small insect, furnished with long hind-legs which enable it to perform most extraordinary leaps. The TREE-HOPPERS of this country, *Membracidæ*, of which there are several species, are small, mostly green, and take leaps of five or six feet.

The family of *Fulgorina* includes the *Lantern-Flies*, of which a large species inhabiting Guiana, the *Fulgora laternaria*, is said to emit considerable light in the dark. This light is produced from a singular prolongation of the head, which is common to this and many other species, exhibiting most extraordinary forms in some instances. A well-known example of the genus *Fulgora* is the *F. candelaria*, constantly to be seen in boxes of Chinese insects. Many of the Fulgorina are of a large size, and decorated with most brilliant colors; but they are all inhabitants of warm climates. The European species are small, and generally very dingy in their appearance.

The *Stridulantia* derive their name from the faculty they possess of producing a chirping

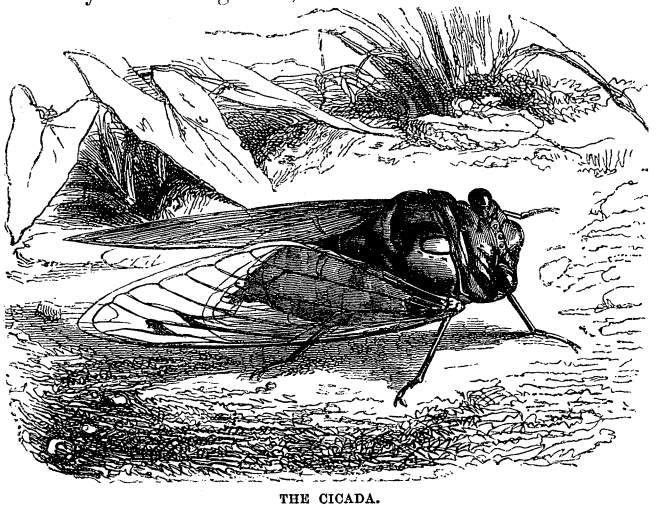
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noise, which, as they are generally of large size, is often exceedingly loud and sometimes disagreeable. Nevetheless, the ancients, and particularly the Greeks, appear to have regarded this music, which is very unpleasant to modern ears, with feelings of great satisfaction; and the *Cicada* is often referred to with expressions of delight by the Greek poets. The apparatus by which the sound is produced consists of a sort of drum placed in a cavity on each side of the base of the abdomen; this is pulled inward by the action of a particular muscle, and on being again let loose its vibration produces a loud, sharp tone. The drums are concealed by scale-like plates, which are sometimes so large as to reach nearly to the extremity of the abdomen.



LANTERN-FLIES.

The female lays her eggs in slits, which she cuts in the bark of trees by means of a curious saw-like ovipositor; the branches are generally so weakened by the operation that they fall to the ground, when the larvæ burrow down to the roots of the trees, upon which they feed, often occasioning considerable damage. They appear to occupy at least two years in their development. In America the cicadas have the general name of *Harvest-Flies;* they are also often improperly called *Locusts.* There are several species, one of which, the Red-eyed Cicada, *C. septendecim*, is remarkable on account of the popular notion that it appears only once in seventeen years, in the same locality, being supposed to pass the interval in its preparatory stages. Hence it is known in this country as the *Seventeen-year Locust.* This idea is, however, unfounded; some of these insects appear among us every year, and they have manifested themselves in vast numbers at irregular intervals of five to ten years. This insect is very different from the locust of the Scriptures; indeed, there appear to have been eleven different species of insect spoken of in the Bible as locusts, but all of which were of the grasshopper family.



THE CICADA.

ORDER 11. **THYSANURA.**

This order derives its name from the Greek *thysanos*, a fringe, and *oura*, a tail, and includes two families, the one called *Poduridæ*, and the other *Lepismidæ*. The former comprises the *Springtails*, having a forked tail, which is usually bent under the insect; by means of its sudden expansion they effect a considerable leap. The latter have a long, spindle-shaped body, usually covered with silvery scales; they are often seen in the sash-frames of windows.

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ORDER 12. **MALLOPHAGA.**

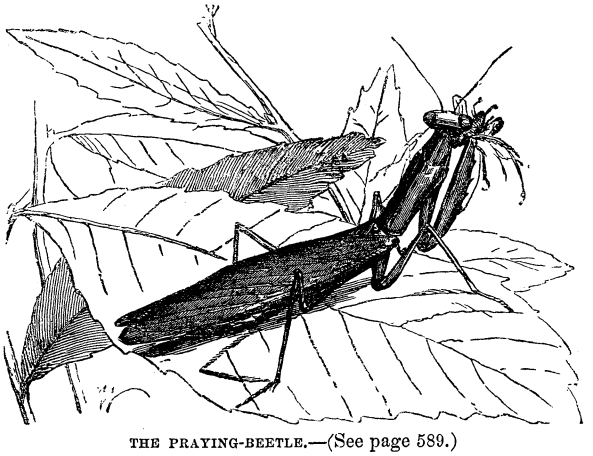
This small order—from the Greek *mallos*, wool, and *phago*, to eat—is composed of insects bearing a general resemblance to the lice, with which, in fact, they are arranged by many authors. They differ from them in having the mouth always formed for biting, being furnished with a pair of hooked mandibles, and distinct upper and lower lips. Instead of sucking the blood of the animals on which they are parasitic, the Mallophaga devour the most delicate portions of their hair or feathers; frequently attacking these organs at the moment of their sprouting through the skin. They are especially common upon birds, few of them being free from such parasites; and some species also infest quadrupeds. As nearly every species of bird has at least one of these peculiar to itself, their numbers are by no means small, and they have been formed into numerous genera.

ORDER 13. **ANOPLURA.**

Neither the habits nor the appearance of the insects forming the present order—whose name is derived from the Greek *anoplos*, unarmed, and *oura*, a tail—are such as to render them particularly attractive objects. Small as they are, perhaps no other insects inspire so much disgust as *Lice*, being generally regarded as the concomitants of dirty habits. They have a flattened and semi-transparent body, with a distinctly separated head, which bears a pair of short, five-jointed antennæ, and one or two simple eyes on each side, and is furnished beneath with a soft, retractile proboscis, within which are four bristle-like organs.

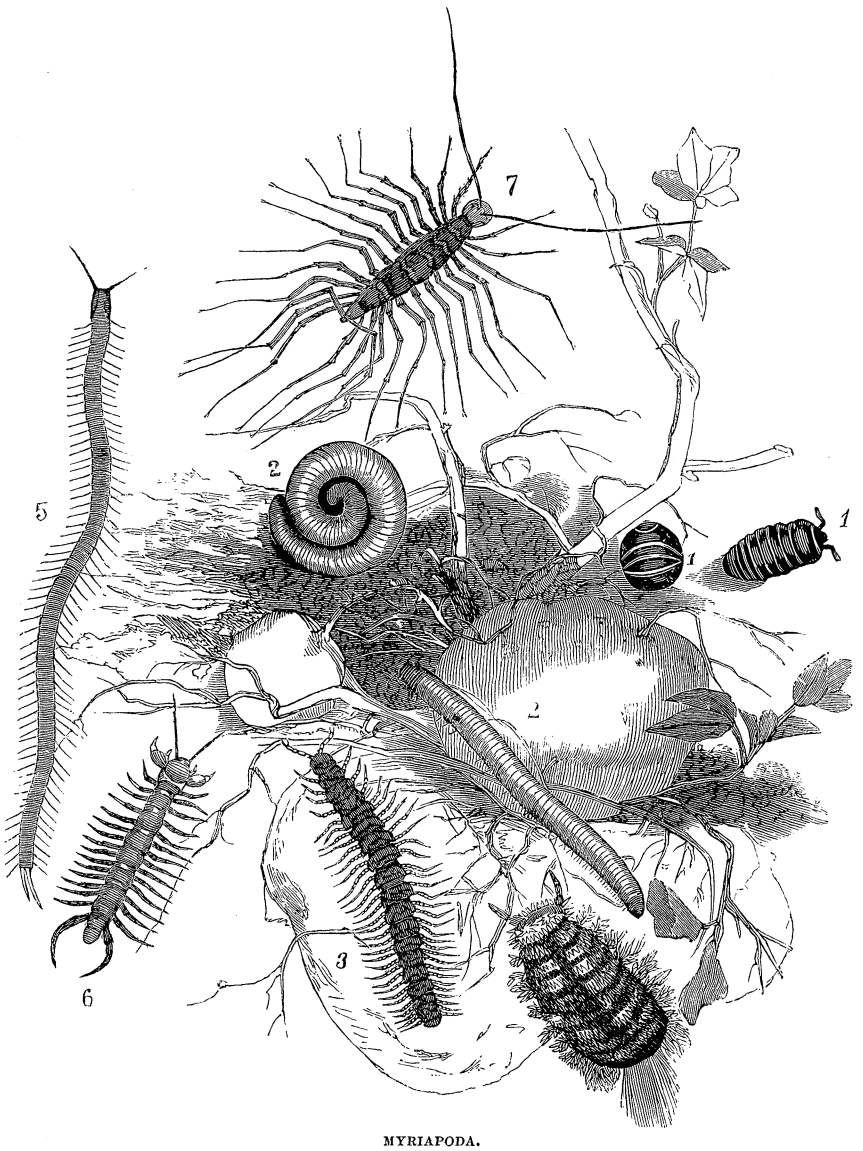
These animals are all parasitic upon mammiferous animals, of which almost every species has its peculiar louse, while some of them harbor three or four distinct species. Four species inhabit the human subject, two of which are common, the Head-Louse, *Pediculus capitis*, and the Body-Louse, *P. vestimentorum;* the *P. tabescentium* has only been occasionally observed, but always in vast numbers, either causing or accompanying a complaint under which the patient appears gradually to waste away. Several instances are recorded in ancient authors of death being caused by this disease, which is termed *phthiriasis*, from the Greek *phtheir*, a louse. The Roman dictator, Sylla, the two Herods, the Emperor Maximian, and Philip II. of Spain, are said to have died of this loathsome malady.

These insects generally infest those parts of their hosts which are most thickly covered with hair, among which they creep about with ease by means of their grasping claws. They attach their eggs, which are of a pear shape, and called *Nits*, to the hairs, and the young are excluded in a few days. They undergo no metamorphosis, and are soon capable of reproduction; so that their numbers rapidly increase, when proper measures for their eradication are neglected.



THE PRAYING-BEETLE.—(See page 589.)

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MYRIAPODA.

1 and 1, Egg and Larva of Iulus; 2 and 2, Iulus; 3, Polydesmus; 4, Glomeris; 5, Geophilus; 6, Lithobius; 7, Scutigera Longicornis.

Class II. MYRIAPODA.

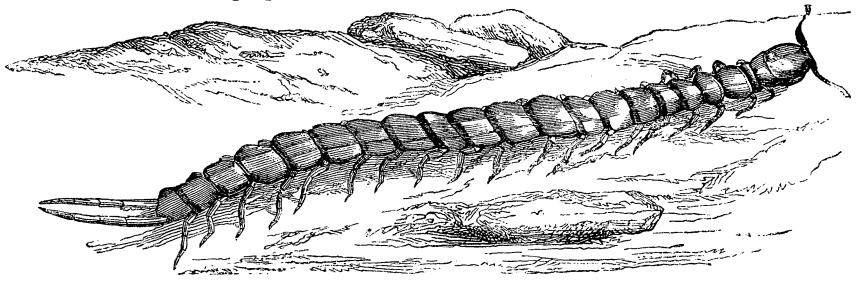
The small class of *Myriapoda* is in its general characters very closely allied to the insects, although in some respects it appears to approach the *Crustacea*. In the mature state, their bodies are generally elongated, and composed of numerous segments, the articulations of the body being similar, and bearing each one or two pairs of jointed legs. The head always has a pair of jointed antennæ, very similar to those of many insects, and behind the insertion of these, on each side, is a variable number of simple eyes, which, however, are sometimes wanting. The mouth, in its general structure, bears a considerable resemblance to that of the masticating insects, being furnished with jaws, palpi, and an upper and lower lip. In their internal anatomy these animals also exhibit a great resemblance to the insects. Their nervous system consists of a series of ganglia running along the ventral portion of the body, and usually united by a

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double thread; the circulation is effected by a long, cylindrical, dorsal vessel. The species are all unisexual. In some kinds the young, on first escaping from the egg, possess nearly all the characters of their parents, although the number of segments and limbs is always less, and increases at each change of skin; but some, as the *Iuli*, undergo a sort of metamorphosis, coming from the egg either quite destitute of feet, or furnished with only three pairs of these organs, and it is not until after several moultings that they attain the same number of legs as their parents. This metamorphosis, such as it is, indicates the close alliance of these creatures with the insects; and many authors either include them in the class Insecta or retain them in a separate class. The Myriapoda form two orders, the *Chilognatha* and the *Chilopoda;* of the former there are over seventy species; of the latter about one hundred.

ORDER 1. **CHILOGNATHA.**

In these the body is generally of a convex form, composed of numerous horny arches, below which an immense multitude of little feet may be seen, whence the name of *Millepedes*, or *Thousand-legs*, by which these animals are commonly known, is derived. Each segment of the body bears two pairs of limbs, with the exception of the hindmost segment, which is destitute of such organs. The antennæ are short, and composed only of seven joints, and the jaws are reduced to a rudimentary condition. The species are found to feed principally upon vegetable matters, generally when in a state of decay. Their movements, notwithstanding their immense number of legs, are always very slow, and they generally endeavor to escape danger by rolling themselves up into a ball. There are several families belonging to this group, but the best-known species is the Gally-Worm, *Iulus terrestris*, often found, like the rest of the tribe, in damp moss, and sometimes crawling over the trunks of trees. The *I. maximus* of Brazil is often seven inches long. The *Glomeridæ*, belonging to this order, resemble wood-lice.



THE ELECTRIC SCOLOPENDRA.

ORDER 2. **CHILOPODA.**

These animals are usually of a flattened form, and live in the earth or under stones. They run with considerable swiftness in pursuit of their prey, and can even progress backward by the assistance of their tail-like hind-legs, which at other times are dragged helplessly behind them. Their food consists of insects, which they seize with the powerful jaw-like organs attached to the lower lip. There are various kinds, but the most remarkable family is that of the *Scolopendridæ*, commonly called *Centipedes:* they are nocturnal in their habits, prey on insects, and are active and voracious creatures. Some of these, in tropical climates—as for instance the *Malfaisante*, a West Indian Scolopendra—grow to the length of six inches, and certain writers say to twice that size. Their bite is very painful, and sometimes fatal. The smaller and harmless species, common among us, are found at night concealed under timber or in holes in walls.

The Electric Scolopendra, *S. electrica*, is a European species, luminous in the dark.

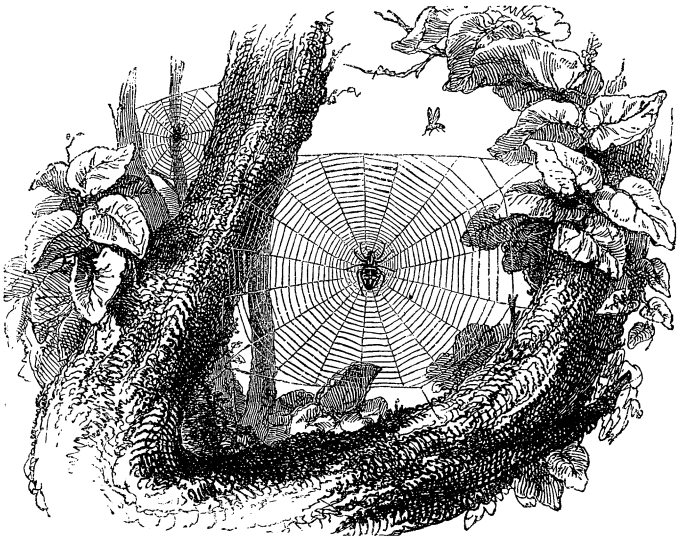
The *Geophilidæ* have almost thread-like bodies, some species of which are phosphorescent.

The species of *Scutigera* have the body divided into fifteen segments, each bearing eight pairs of long multi-articulated legs; they are very active, and often lose some of their legs when touched. Those of the genus *Lithobius* have the body above and below divided into the same number of segments, each of which bears a pair of legs.

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Class III. ARACHNIDA.

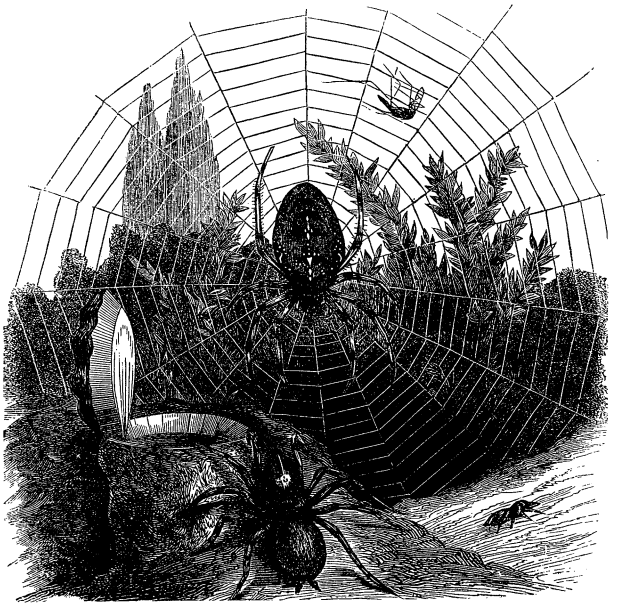
This class includes spiders, scorpions, mites, &c.; they are distinguished by aerial respiration, and the possession of four pair of legs, attached to the anterior part of the body. They have no antennæ; the jaws terminate with a claw-like joint, which conveys poison into the wounds inflicted by them, this, in the larger species only, being injurious to man, though usually fatal to the insects on which they prey. The legs are generally formed of the same joints as those of insects. All the species are unisexual; all lay eggs, with the exception of the scorpions and a few mites, in which the ova are retained in the oviduct till they are hatched, and are thus produced alive. They are divided into five orders, the *Dimerosomata*, *Polymerosomata*, *Adelarthrosomata*, *Acarina* or *Monomerosomata*, and *Podosomata*.



GARDEN-SPIDERS.

ORDER 1. DIMEROSOMATA.

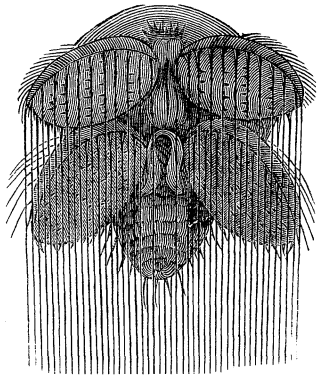
This order derives its name from the Greek *dimera*, divided into two parts, and *somata*, bodies, and includes generally those creatures which we call *Spiders*. In these the body consists of two distinct portions, of which the anterior, or cephalothorax, is usually of an oval form, and covered with a plate of a somewhat horny consistence, while the posterior, or abdomen, generally forms a soft, roundish mass, without any traces of segmentation, and which is attached to the base of the cephalothorax by a narrow peduncle. On its anterior portion the cephalothorax bears six or eight simple eyes; below and in front of these are seen the large mandibles, which serve these animals for the destruction of their prey; beneath is the opening of the mouth, furnished with a pair of masticating jaws, or maxillæ. These organs occupy the front of the cephalothorax; the lower surface of this bears four pairs of jointed legs, furnished at their extremities with claws, which are often of a very singular, comb-like structure.



THE GARDEN-SPIDER AND TRAP-DOOR SPIDER.

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The most remarkable organs perceptible on the abdomen of spiders are the *spinnerets*, by means of which they spin their curious and often beautiful webs, which have attracted the attention and excited the admiration of mankind in all ages. These spinnerets are little teat-like organs, placed close to the extremity of the abdomen, on its lower surface. They are sometimes four, sometimes six in number, and may usually be recognized by the naked eye. Each of them bears at its apex a multitude of minute tubes, of which as many as a thousand are present in some species; so that the delicate thread by which these creatures suspend themselves in the air must frequently be composed of at least four thousand slender filaments. The substance of which the threads are composed is secreted by glandular organs, situated in the abdomen, close to the base of the spinnerets. It is a viscid fluid, which speedily hardens on exposure to the air. The spider usually commences its thread by applying the spinnerets to some fixed object; to this the glutinous secretion attaches itself, when the movements of the creature are sufficient to draw out the materials necessary for the continuation of the thread. The hind-feet are always applied to the thread at a short distance from the spinnerets, probably in order to bring the numerous filaments into contact before their hardening has proceeded too far to allow of their adhesion. This power of spinning threads is of the greatest importance to all these animals, as it not only serves many of them for the construction of dwellings, and of nets for the capture of prey, but appears to be constantly employed in securing them from falls while in motion, or in descending in a direct line from an elevated position to some object below them. Many of them have the faculty of emitting threads, one end of which floats freely in the air until it meets with some object to which it adheres. By this means spiders often form natural bridges, by which they can pass over brooks and ditches. Some species avail themselves of the same power to take long flights in the air, where they often attain great altitudes. Those spiders whose instinct prompts them to employ their spinning powers in regular weaving operations, manifest this in various ways.



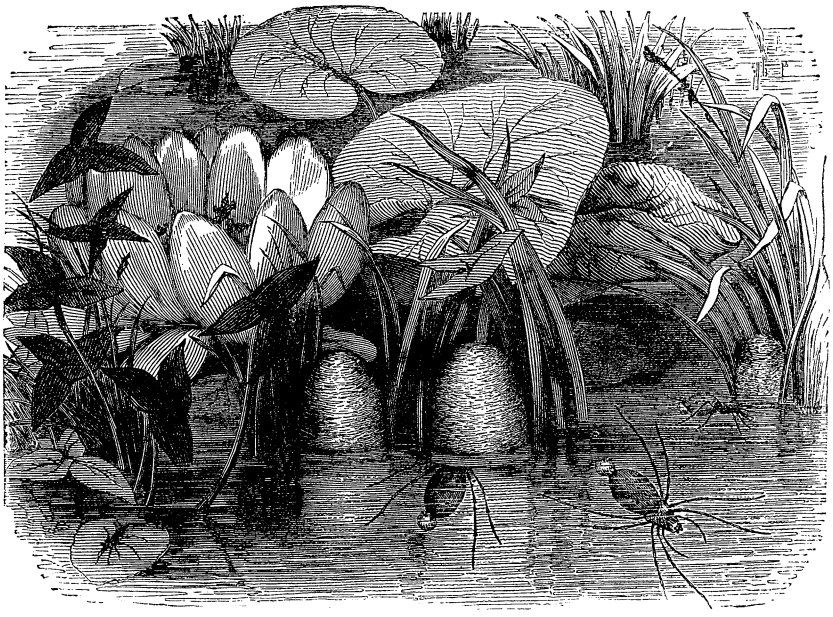
SPINNERETS OF A SPIDER MAGNIFIED.

Some, of which the Common Garden Spider, *Epeira diadema*, is an excellent example, construct a beautiful net, composed of stout radiating lines, intersected at tolerably regular intervals by circular filaments. It appears that the latter are beset by an immense number of viscid globules, which doubtless assist greatly in entangling any insect that is so unfortunate as to come in contact with the web of the destroyer. The mode in which the creature forms this elegant structure, its readiness to rush out of its concealment the moment some hapless fly has become entangled in its meshes, the rapidity with which it shrouds its victim in a silken coat, and the care with which it repairs any damage done to its net, are all exceedingly curious and interesting points in its natural history.

The nets of some of the large tropical spiders are said to be of strength sufficient even to capture small birds. Other species, such as the Common House-Spider, *Aranea domestica*, weave a close, cloth-like web, usually placed in obscure corners; this is furnished with a sort of funnel-shaped cell, within which the spider lies in wait for his prey. Others again employ their silk merely to line the holes and crevices which form their ordinary places of abode; and some of these exhibit great ingenuity in the construction of their nests. Another purpose to which this secretion is applied by all spiders, is the formation of little silky cases or cocoons for the reception of the eggs, and which a few species carry about with them. Attempts have been made to employ this silk, which differs considerably in its texture from that of which the nets are constructed, for industrial purposes, but hitherto with very little success.

The spiders are all predaceous animals, and generally of an exceedingly fierce and sanguinary disposition. They prey with avidity upon insects and other articulated animals of smaller size than themselves; but, unless in self-defense, they do not appear to turn their weapons against the higher animals. They are divided into several families.

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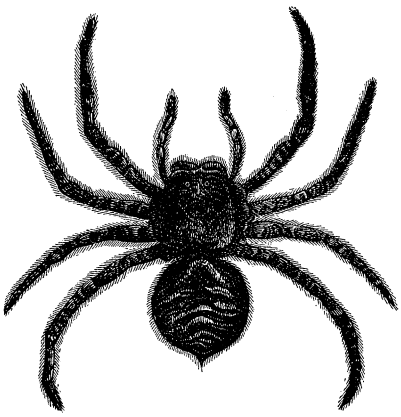


THE DIVING-SPIDER AND ITS NESTS SHOWN ABOVE THE WATER.

THE ARANEIDÆ.

These have the eyes in two rows, one behind the other; they usually possess six spinnerets and only a single pair of pulmonary sacs. All these spiders spin themselves a dwelling-place, which is generally connected with a net for the capture of prey. Perhaps the best known of these is the Garden-Spider, already described, and whose threads often force themselves upon our attention.

This species forms one of the most beautiful of what are called *geometrical webs;* many of the others form a somewhat similar structure, although without displaying the same wonderful regularity. Of these the MALMIGNATTE, *Theridion malmignatta*, much dreaded in the south of Europe, is an example. Our common House-Spider, which we have just mentioned, belongs to this group. Another remarkable member is the DIVING-SPIDER, *Argyroneta aquatica*, which weaves itself a curious little bell-shaped dwelling at the bottom of the water, to which it retires to devour its prey. As, notwithstanding its aquatic habits, this animal, like the rest of its class, is fitted only for aerial respiration, it takes care to fill its miniature dome with air, which it carries down with it from the surface among the hairs with which its body is thickly clothed: a process very closely resembling that by which the earliest diving-bells were supplied with air.



THE TARANTULA.

THE LYCOSIDÆ.

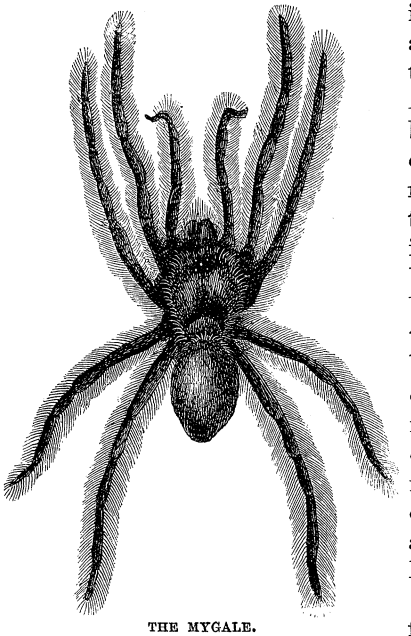
Unlike the Araneidæ, the animals of this family never construct regular webs for the capture of prey, their utmost exertion of instinct, in this direction, consisting in laying a few threads in the neighborhood of their dwelling-place. They generally live under stones, in holes in the earth, or in old walls, sometimes lining their habitations with a silky tapestry; and some, which live upon trees, weave themselves a silken nest among the leaves or on the branches. They all take their prey by force; some of them running it down by swiftness of foot, while others spring suddenly upon their unwary victims. The most celebrated of these spiders is the

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Tarantula, *Lycosa tarantula*, of Southern Europe, whose bite is supposed by the natives of Italy to cause death, unless the patient be relieved by music and violent dancing. Some of these spiders can run in any direction, and are called *Side-Walkers;* a common example is the *Salticus scenicus*, a small species banded with black and white, which may frequently be met with on garden walls.

THE MYGALIDÆ.

The spiders with which we in temperate climates are most acquainted are of small size, but in hot regions there are species whose extended legs occupy a circle of six or seven inches in diameter. Some of these, belonging to the genus *Mygale*, found in South America and Mexico, are said to attack young humming-birds, and to climb trees for this purpose. Species occur on the shores of the Mediterranean; but they are, for the most part, confined to tropical countries. They resemble the Lycosidæ in their habits, generally living on the ground, in holes or under stones. Some of them form long, twisted burrows for themselves, which extend as much as two feet below the surface of the ground. The bite of the large tropical species of Mygale, generally called *Spider-Crabs* by the colonists, is said to be very dangerous. Some spiders, like the *Ctenizæ*, close the mouth of their subterranean residence with a most ingeniously-constructed trap-door, which the inhabitant closes with the utmost pertinacity when any attempt is made to invade the privacy of his domicile. Hence these, of which several species are found in the south of Europe and on the shores of the Mediterranean, are generally known as *Trap-door Spiders.*

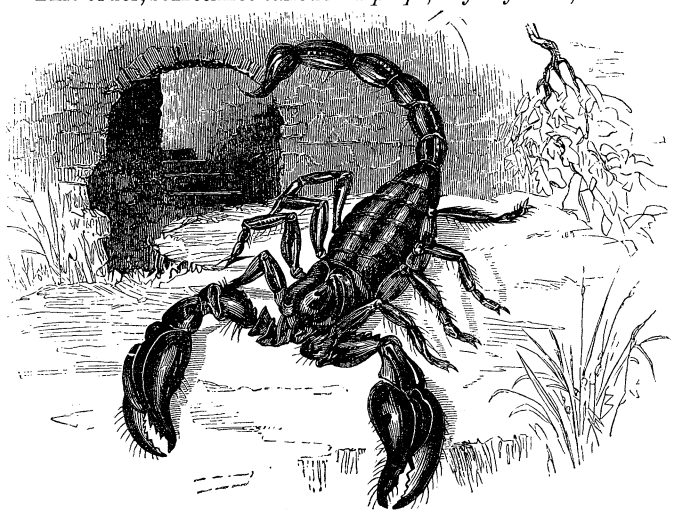


THE MYGALE.

The species of spiders are very numerous, and their forms, instincts, and habits greatly diversified. In general they may be regarded as among the most active, ingenious, and predaceous of the smaller articulata.

ORDER 2. **POLYMEROSOMATA.**

This order, sometimes called *Pedipalpi*, or *feet-feelers*, and which derives its name from the Greek *polus*, many, *mera*, divisions, and *somata*, bodies, includes two families, the first of which is the *Scorpionidæ*, characterized by their elongated tail-like abdomen, armed at its extremity with a sort of hooked claw, which, when the creatures are in motion, is always carried over the back in a most threatening attitude. This claw-like organ is the sting, of the formidable nature of which such extraordinary accounts are given by the natives of countries to which the larger and more voracious species are confined. The poison glands are situated close to the



THE SCORPION.

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base of this organ, and their ducts run to its point, so that when the creature strikes with its weapon, a small portion of the venom is instilled into the wound. Whether this venom is ever fatal to human life appears still to be a matter of dispute; but the effects of the scorpion's sting are doubtless very disagreeable. The female scorpion exhibits the greatest care for her young, carrying them upon her back for some days after they are hatched, and attending to them closely for about a month, after which they are able to take care of themselves. Scorpions generally live on the ground under stones and in dark places, coming out at night in search of prey; but they frequently find their way into the interior of houses.

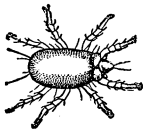
The animals forming the second family, the *Thelyphonidæ*, present an appearance in some degree intermediate between the scorpions and the true spiders. Many of them are of large size and a somewhat forbidding appearance, and, like the scorpions, can run in every direction. They are almost confined to tropical countries, inhabiting principally the hottest parts of Asia and America.

ORDER 3. **ADELARTHROSOMATA.**

This order, deriving its title from the Greek *adelos*, hidden, *arthros*, an articulation, and *somata*, bodies, includes several families, among which are the *Phalangidæ:* of these are the *Harvest-Men* or *Harvest-Spiders*, having stilt-like limbs, with which they stalk about among plants in search of insects, on which they feed. The *Cheliferidæ* resemble little scorpions that have lost their tails; they frequent houses and get among old books, seeking for their minute prey. The *Solpugidæ* include several spider-like animals, among which is the *Galeodes araneoides*, attaining the length of two inches. It is found in the hot parts of Asia and Africa, and is a great torment to camels. It is a fierce creature and its bite is venomous.

ORDER 4. **MONOMEROSOMATA.**

This order derives its name from the Greek *monos*, one, *meros*, a joint, and *somata*, bodies; it is sometimes called *Acarina*, from the Greek *akari*, a mite. It includes the *Linguatulidæ*, curious worm-like animals, found in the frontal sinuses and lungs of various mammalia: the *Simoneidæ*, minute, soft creatures, furnished with four pairs of legs, which frequently take up their abode in the follicles of the human skin, and hence are called *Maggots in the Skin:* and the *Macrobiotidæ*, called *Sloth* or *Bear Animalcules*, microscopic creatures often found in the sandy dust of house-roof gutters. To these we must add the *Acaridæ*, or *Mites*, some of which are active, like the Cheese-Mite, *Acarus domesticus*, and others are parasitic upon or beneath the skin of man and other animals. One species of these is the Itch-Mite, *Sarcoptes scabiei*, producing a well-known disease among people of filthy habits. The *Ixodidæ* live upon various kinds of animals: some upon dogs, others upon serpents, others upon reptiles, and others upon dung-beetles.



CHEESE-MITE MAGNIFIED.

Beside these there belong to this order the *Hydrachnidæ* or *Water-Mites*, attaching themselves to water insects; the *Oribatidæ*, living chiefly upon mosses; the *Bdellidæ*, living among damp moss, and the *Trombidiidæ*, of which the little *Scarlet-Mite*, seen in gardens, is an example.

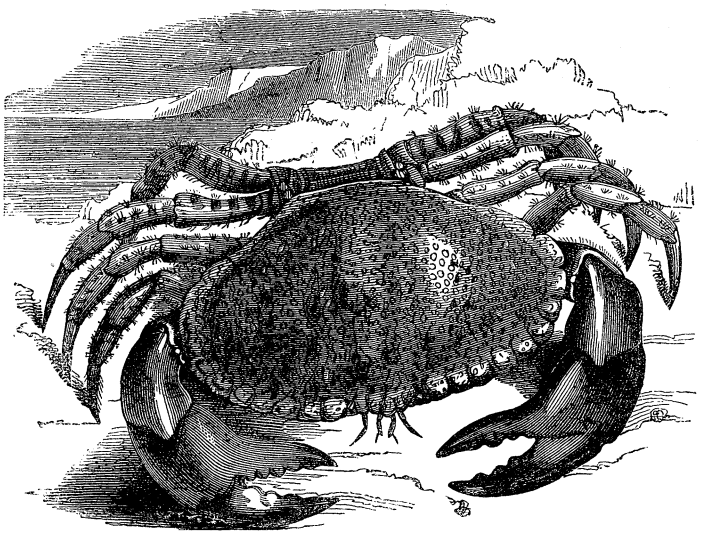
ORDER 5. **PODOSOMATA.**

These animals form two families of marine, spider-like creatures—the *Pycnogonidæ*, which are parasitic in their habits, and have the palpi obsolete; and the *Nymphonidæ*, which crawl about slowly among the stones and weeds of their aquatic home, and are furnished with distinct palpi.

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Class IV. CRUSTACEA.

At the head of this class stand the crabs, lobsters, prawns, and the like; there are, however, many other animals associated with them of extremely different shapes and habits. In general, it may be said of the prominent members of the class that the form of the body is usually somewhat spindle-shaped, and divided into a series of distinct rings, articulated together, and allowing of a considerable amount of movement. These segments are sometimes of nearly equal size, and are furnished with nearly similar appendages throughout. Sometimes a few of the segments acquire a greater degree of development than the rest, and the organs of motion are confined to these, while the appendages of the other segments are reduced to a more or less rudimentary condition, and in the higher forms the anterior segments become fused into a single mass, called the *cephalothorax*, which bears the mouth and organs of motion. The skin is generally hardened by a calcareous secretion, constituting a complete cutaneous skeleton, within which all the soft parts of the body are inclosed; the segments are united by a thin membrane, which gives flexibility to the whole armor. As the animal has no power of adding to the size of this shell to make room for its increasing growth, it casts off its old coat at stated periods, and secretes a new deposit of calcareous matter over its entire surface. The form of the articulated appendages—the legs and feet—varies exceedingly.



THE COMMON EUROPEAN CRAB.

The nervous system of the *Crustacea* always consists of a series of ganglia running along the surface of the body, united to each other, and to a cephalic ganglion or brain, by a pair of nervous filaments, and giving off nerves to the various organs in their neighborhood. The cephalic ganglion is always situated above the œsophagus, and furnishes nerves to the organs of the senses. These are the eyes, the antennæ, and in many cases organs of smell and hearing. The digestive canal generally exhibits a high degree of development. The respiratory organs consist of branchiæ of various forms. With the exception of a single order, the species are all unisexual, and reproduction takes place by ova, which are generally attached to the tail of the female for some time after exclusion. Their development presents many curious phenomena.

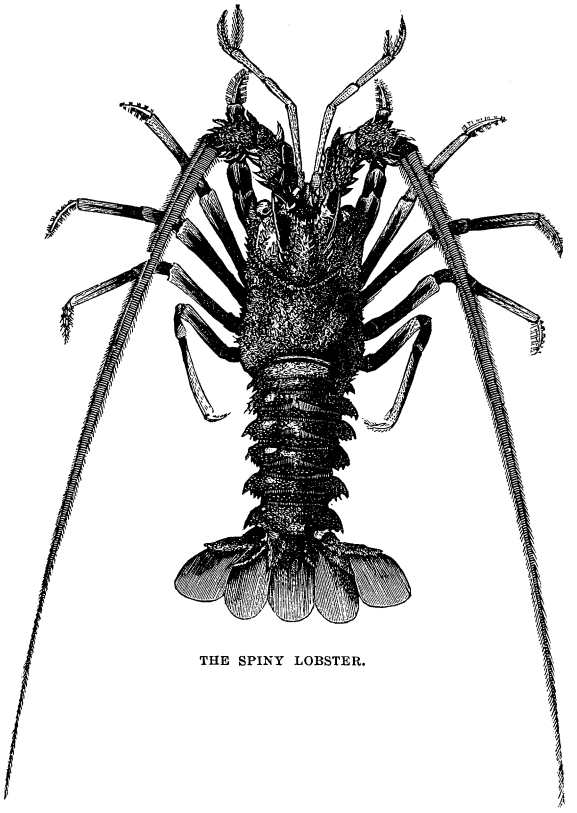
The immense number and variety of the Crustacea—from the Latin *crusta*, a crust, or hard covering—have caused them to be divided and subdivided into numerous groups; we shall, however, notice them briefly under the following eleven orders: *Decapoda*, *Stomapoda*, *Isopoda*, *Amphipoda*, *Lœmodipoda*, *Xyphosura*, *Phyllopoda*, *Ostracoda*, *Copepoda*, *Parasita*, and *Cirrhopoda*.

ORDER 1. DECAPODA.

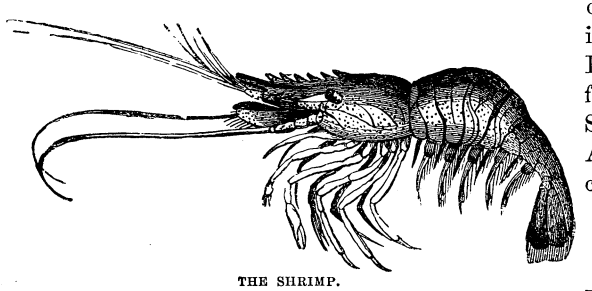
This term signifies *ten-footed*, and includes all those stalk-eyed crustacea, in which the whole of the thoracic segments are united with those of the head into a single mass, incased in a common shell, with no traces of segmentary division, and which have the branchial organs inclosed

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within a cavity on each side of the cephalothorax. The true thoracic legs are almost always ten in number—whence the name of the order. It includes an immense number of species, generally of considerable size when compared with the other crustacea. We shall notice them under three sub-orders, the *Macrura*, *Anomura*, and *Brachyura*.



THE SPINY LOBSTER.



THE SHRIMP.

THE MACRURA.

This term, from the Greek *makros*, long, and *oura*, a tail, embraces those species which are generally called the *Long-tailed Decapod Crustacea*.

THE CRANGONIDÆ.

This family includes the well-known *Shrimps* and *Prawns*. They are distinguished by the possession of a large oval or triangular appendage which covers the base of the first joint of the outer antennæ. In their general appearance they all present a considerable resemblance to the COMMON EUROPEAN SHRIMP, *Crangon vulgaris*. They inhabit salt water, and generally occur in large numbers, found together on sandy coasts; and in spite of their small size, they are everywhere in great request as articles of food. The common shrimp of Europe is about two inches long; the COMMON EUROPEAN PRAWN, *Palemon serratus*, is three to four inches long. The AMERICAN BAIT-SHRIMP, *Crangon septemspinosus*, and the AMERICAN PRAWN, *Palemon vulgaris*, are common on our coasts.

THE ASTACIDÆ.

To this family belongs the Common Lobster, distinguished from the preceding by the small size of the appendage at the base of the outer antennæ, besides many other differences in form and structure. The anterior pair of feet is always much larger than the others, and armed with powerful nippers. Some of these animals live in fresh water. These are of a smaller size than the marine species, but are also eaten in great numbers by the inhabitants of the neighborhoods where they occur. Lobsters change their shell annually; before casting the old shell they are sickly and grow thin, and thus, though with great effort and apparent suffering, the old covering is cast off, and the new one is speedily formed by secretion. Sometimes lobsters throw off their claws in consequence of fright, and often they will hold on to an object till the claws are torn off. To some extent these lost parts are reproduced. They are very active in the water, and can spring to a considerable distance; they feed chiefly at night. They are voracious, and eat any animal matter that comes in their way. Immense numbers of the EUROPEAN LOBSTER, *Astacus marinus*, are taken, but the means of increase are abundant, twelve thousand four hundred and forty-four eggs having been found under the tail of a single female. The COMMON AMERICAN

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Lobster, *Homarus Americanus*, abundant on our coasts from New Jersey northward, is used in very large quantities; it is nearly twice the size of the common European species, weighing from two to thirty-five pounds; the average weight, however, being four pounds.

The Cray-Fish, *Astacus fluviatilis*, is very common in European rivers; and may be seen for sale, boiled as red as a lobster, in many inland towns there. The American Cray-Fish, *A. Bartonii*, often called *Fresh-water Lobster*, is exceedingly common in some of our mountain streams. It is rarely eaten. There are three or four other species, from three to four inches long.

THE PALINURIDÆ.

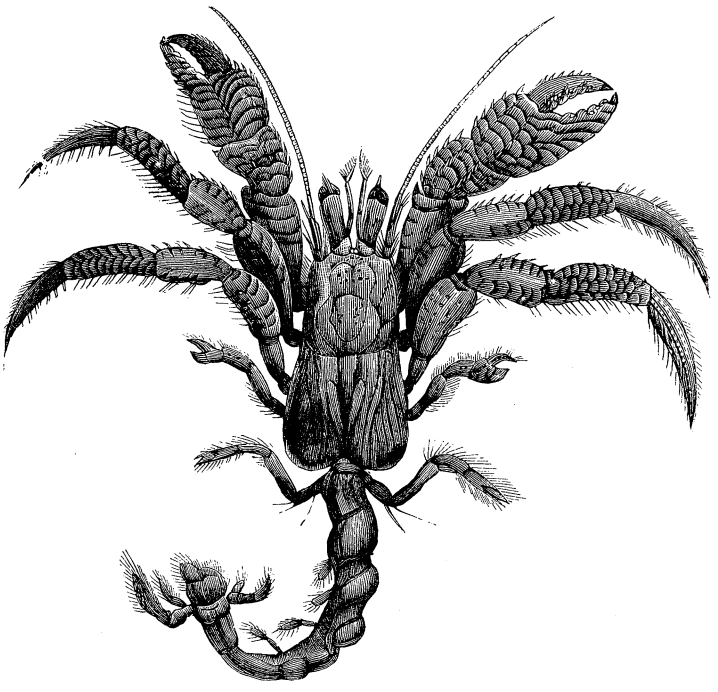
This family includes some of the largest of the Crustacea. These are powerful animals, with very hard shells. The breast is broad, the outer antennæ usually very long; the anterior feet are rarely furnished with nippers, and these, when present, are small. They inhabit the sea, where they usually frequent deepish water not far from the shore. Many of them are used as food in various countries. The Spiny Lobster, *Palinurus vulgaris*, which may be taken as the type of the family, often weighs as much as twelve or fifteen pounds. It was in great esteem among the ancient Romans, who denominated it *Locusta*. The French call it *Langouste*, and the English *Sea Craw-Fish*. It is eaten, but is inferior to the common lobster.

THE ANOMURA.

This term is from the Greek *anomos*, irregular, and *oura*, a tail, and is descriptive of the species belonging to this sub-order; it includes the *Crabs*, whose spiteful disposition has given us the word *crabbed*, and whose curious habit of running or swimming forward, sideways, or backward has always provoked the mirth of observers. They are of many forms and a great variety of sizes.

THE PAGURIDÆ.

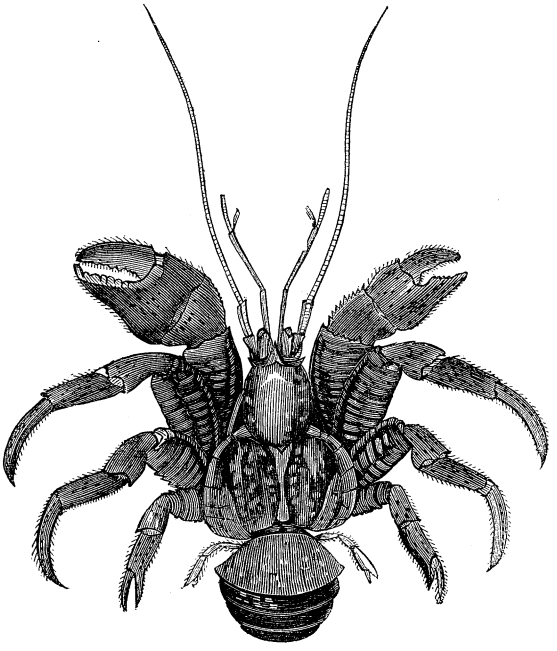
This includes the Hermit or Soldier Crab, *Pagurus Bernardus*, the abdominal portion of whose body is quite soft, forming a sort of cylindrical fleshy mass behind the shelly cephalothorax. As the comfort of the animal would be materially interfered with were this soft, worm-like appendage exposed to be grabbed at by every passing fish who might take a fancy to it, he usually seeks some shelter for his tail, and the habitation selected is generally the empty shell of some univalve mollusk. Into this spiral home the Hermit Crab is coiled, and retains himself in his position by means of a sucker at the extremity of his tail, assisted by two or three rudimentary feet, which are developed upon the abdominal sac; and so firmly does he adhere to his castle, that he will allow himself to be torn to pieces rather than let go his hold. By protruding his body, with its three pair of legs, from the orifice of the shell, the little Hermit is enabled to walk with ease



THE HERMIT-CRAB.

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upon the sandy beach in search of his prey; but the moment danger threatens him he disappears into his cell, the orifice of which is then occupied by one of his claws, which is always larger than the other. As the crab does not possess the same power of adding to the size of the domicile that was enjoyed by the original tenant, he is compelled, from time to time, to change his residence for one a little larger, and often appears almost as difficult to please as a human householder in the same predicament. Often they may be seen crawling about among the shells just thrown upon the beach, trying one after another, until they meet with one uniting all the conditions requisite for crustacean comfort; but, until this great object of their search is attained, always returning to their old house after each unsuccessful trial. It is said, indeed, that when two of them happen simultaneously to cast a longing eye upon some particularly suitable residence, they often engage in a fierce battle for the possession of the coveted object, which the victor carries off in triumph.

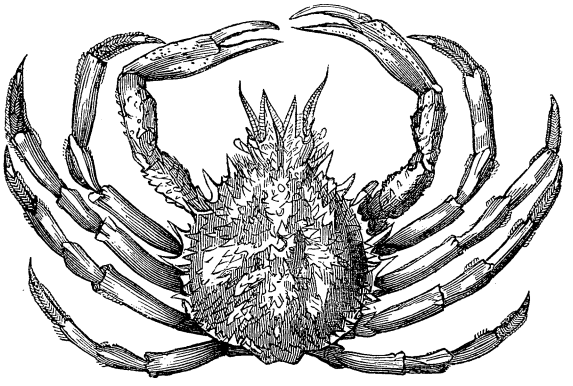


THE PURSE-CRAB.

The PURSE-CRAB, *Birgus latro*, is a very curious species found in Amboyna and some of the adjacent islands. They inhabit the fissures of rocks along the seashore by day and come forth at night to search for food along the beach. When they meet a person they set up their claws in a threatening manner and snap their pincers and retreat backward. The natives say they climb the cocoanut-trees to get the cocoanuts.

THE BRACHYURA.

This term is from the Greek *brachus*, short, and *oura*, tail, and includes the *Short-tailed Crabs*, of which the Common Crab may be taken as the type.



THE SPINOUS SPIDER-CRAB—MAIA SQUINADO.

THE MAIADÆ.

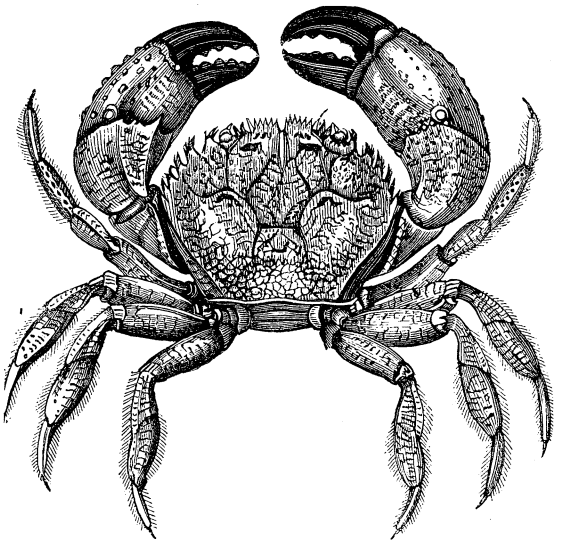
This includes the *Spider-Crabs* or *Sea-Spiders:* in these the legs are long and hairy; the back is usually covered with spines and hairs. They generally live in deep water, and rarely approach the shore. One species, the *Libinia canaliculata*, is common along our coast from the Chesapeake northward. It is said to frequent the oyster-beds, and to devour large quantities.

THE CANCERIDÆ.

The genus *Cancer* of Linnæus included the Crabs generally, many of which, though bearing the general form of the more common species, are still possessed of very peculiar and remarkable features. The *Eriphia spinifrons*, for instance, distributed in nearly all seas, has the front covered with numerous sharp spines; and the *Parthenope horrida*, a native of the Atlantic and Indian

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Oceans, is covered with the most grotesque ornaments. Almost every shore has its peculiar species. On our coasts we have many kinds, as the *Oyster-Crab*, *Mud-Crab*, *Sand-Crab*, *Edible Crab*, &c. The multiplicity and variety of the species, have, in fact, led to the distribution of the crabs in several families—that of the *Canceridæ*, at the present day, including only those of which the COMMON CRAB OF EUROPE, *Cancer pagurus*, is the type. These have the shell regularly rounded in front and narrowed behind; the legs are of moderate length, the claws large, and often unequal in size. This species inhabits deep water, and is captured in large quantities by sinking baskets, pots, or nets, baited with carrion, in places which it is known to frequent. Many other kinds are eaten in different parts of the world.



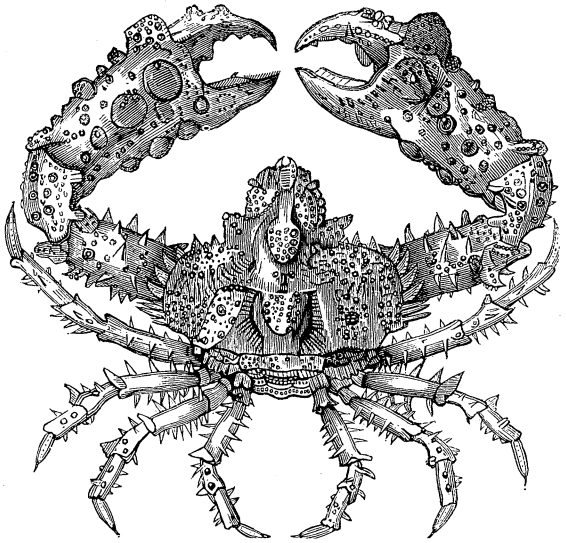
THE ERIPHIA SPINIFRONS.

THE PORTUNIDÆ.

The crabs of this family are nearly allied to the *Canceridæ*, and are sometimes called *Paddling Crabs*.

The COMMON EDIBLE CRAB of this country, *Lupea dicantha*, is found on our coast from Florida to Cape Cod. These, like the other crabs, cast their shells once a year. The period in which they are sloughing off is but two or three days, when the new shells are speedily formed; but while the crabs are thus naked, or the new covering is tender, they are called *Soft-shell Crabs*, and are in the greatest estimation among epicures. This species is abundant on the muddy shores of bays and creeks, and is often caught in such quantities as to be given for food to hogs.

The COMMON SMALL EDIBLE CRAB, *Carcinus mœnas*, is a small species, common on the coast of England and France, and found at low tide buried in the sand beneath stones; it runs with rapidity, and is called the *Enraged Crab* by the inhabitants. This species, or one closely resembling it, is common on our coasts. Some of the crabs of the genus *Lupea* live in the ocean, and are sometimes called *Swimming-Crabs*. They are often seen floating on the sea-weed, and appear to have the faculty of sustaining themselves on the surface of the water in a state of complete repose.



THE PARTHENOPE HORRIDA.

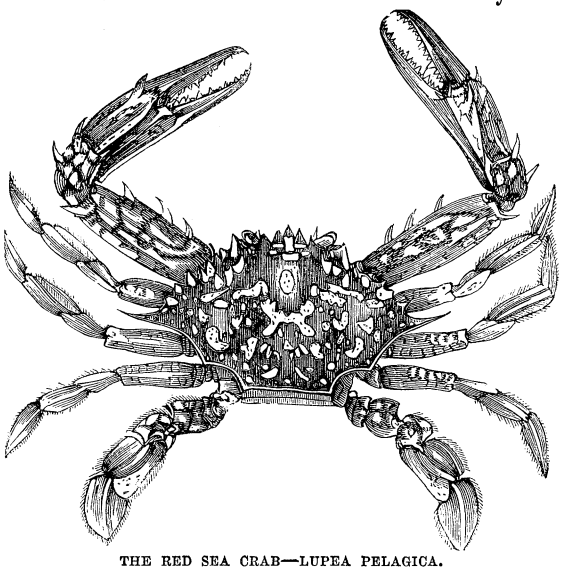
THE OCYPODIDÆ.

In this family the carapace is usually quadrilateral, sometimes oval, with the front generally transverse and knotted; it includes the LITTLE PEA-CRAB, *Pinnotheres pisum*, which takes shelter in shells of the bivalve mollusca, especially the common mussel. The ancients were acquainted with one species of Pinnotheres, which inhabits the shell of the *Pinna*, a common Mediterranean mollusk. They believed that the connection between the crab and the mollusk was one of mutual advantage, and that the former, in return for the protection afforded to him by

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the shell of his host, not only gave him timely notice of any approaching danger, but also procured him his food. There are several American species of the genus Pinnotheres.

The most remarkable members of this family are the *Land-Crabs* of tropical climates, which are furnished with a peculiar apparatus of leaflets, for retaining moisture in the interior of their branchial cavities. Many of these animals live upon the sides of mountains, at a considerable distance from the sea, which, however, they regularly visit once a year for the purpose of depositing their eggs. In their migrations they sometimes form a procession one hundred and fifty feet wide and three miles in length. They abound in Jamaica, where they are esteemed excellent food. They generally select moist localities for their terrestrial residence. Here they excavate considerable burrows, in which they conceal themselves during the day, roaming about at night in search of food. But some, such as the *Gecarcini*, are said to inhabit dry woods.



THE RED SEA CRAB—LUPEA PELAGICA.

The Violet Crab, *Cardisoma carnifex*, which usually inhabits the mangrove swamps of the West Indian Islands, lives principally upon the fruit of a species of *Annona*, which grows in those places. But nothing comes amiss to it. Those individuals whose residence is in the neighborhood of the cemeteries are said to burrow down to get at the dead bodies, and Dr. Duchassaing tells us that the West Indian burial grounds are pierced in every direction by the burrows of these animals. Nevertheless the Violet Crab is regarded as a luxurious article of food by the West Indians, who, however, take care only to eat those which live in the mangrove swamps, as far as possible from the cemeteries. They are caught in box rat-traps baited with a piece of their favorite fruit; and after their capture they are usually kept some time and fattened with broken victuals.

Another group of Land-Crabs, the *Gelasimi*, are distinguished by the large size of one of their claws, which they hold up in a menacing attitude as they retreat from any object that has inspired them with alarm. From the beckoning action of this claw the Gelasimi have received the name of *Calling-Crabs*. They make great use of it also in forming their burrows, bringing up small pinches of sand or earth every now and then, and scattering these waste materials to a considerable distance round their hole, so as to avoid the presence of an unsightly heap at the entrance of their domicile. An American species, very common on our coasts, the *Gelasimus vocans*, is commonly called the Fiddler, from the shape of one of its claws or fingers, which resembles the bow of a fiddler. It remains closed up in its hole during winter. Though living on the land, it seems to be at home in the water. The *Thelphusæ* are also Land-Crabs, yet some of the species inhabit fresh water.

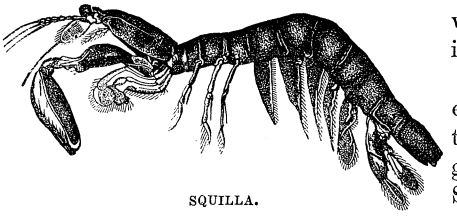
ORDER 2. **STOMAPODA.**

This order is composed of some singular animals, which appear to have relations with all the other groups of Crustacea, and of course exhibit a corresponding diversity of structure among themselves.

The family of *Phyllosomidæ* are animals of an extraordinarily flattened form, with the shell thin and transparent; the body is apparently divided into two parts—a longish or oval cephalothorax, bearing the eyes, which are supported upon long, slender stalks, the short antennæ, and the

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mouth, and a second piece, composed of the thoracic segments, which bears seven or eight pairs of long, slender feet on its margins. The abdomen is very small. These animals are oceanic in their habits, and are generally found in the southern seas.



SQUILLA.

In the second family, the *Squillidæ*, the body is elongated, and bears a considerable resemblance to the well-known insect, the Mantis; hence the typical genus *Squilla* is frequently called the *Sea-Mantis*. Some of them attain the length of a foot or more, but their average size is about three or four inches. They are esteemed for food. The eyes are mounted on short footstalks. The antennæ are of moderate length, and the outer pair have an oval plate at the base. The *Squilla empusa*, three to four inches long, is frequently taken on our coasts, but it appears to have no popular name.

The species of the third family, the *Mysidæ*, closely resemble the shrimps, the thoracic segments being completely inclosed in a carapace, and the abdomen bowed and furnished at its extremity with a caudal fin of five plates. They have received the name of *Opossum-Shrimps* from the curious pouch, formed of plates attached to the abdominal legs, in which the female protects both her eggs and young until the latter have attained a considerable development. They are not common in the European seas, but swarm in profusion in some parts of the world, especially in the Arctic Ocean, where they are said to constitute an important portion of the diet of the whale. The *Mysis spinulosus* is abundant on our coasts in winter. Other species are known on the coasts of Georgia and Florida.

ORDER 3. **ISOPODA.**

This order includes the greater part of the *Edriophthalmata*, that is, *Fixed-eyed Crustacea;* the animals composing it exhibit a great varity of form and structure. The body is sometimes of an oval, sometimes of an elongated form, convex above and flat beneath; the head is small, distinctly separated from the first thoracic segment, and bears a pair of round eyes, usually formed of a collection of simple eyes, but sometimes truly compound. They are divided into three sections, denominated, from their habits, *Cursorial*, *Natatorial*, and *Sedentary* Isopods. The latter comprises those species which are fitted for a strictly parasitic existence, being furnished only with clinging feet. We include only a single family in this section, the *Bopyridæ*, which live in the branchial cavity of shrimps.

The *Natatorial Isopoda* include the *Cymothoidæ*, which are parasitic upon fishes, apparently having an especial predilection for their tails; they have small heads, with short antennæ, and the legs are short and terminated by hooks: also the *Sphæromidæ*, which have a nearly hemispherical body and live in the sea, particularly on rocky coasts.

The *Cursorial* or *Walking Isopods*, include the *Idotheidæ*, which all live in the sea; they are of an elongated form, and the antennæ are usually of great length. The *Idotea cæca*, one-third of an inch long, is known on our shores, and makes the serpentine tracks often noticed in the sand. The *Asellidæ* resemble the preceding in many respects. One species, the *Limnoria terebrans*, about one-sixth of an inch in length, is exceedingly destructive to woodwork immersed in the sea. It bores into timber in every direction, apparently for the purpose of feeding upon it, and has often produced great alarm by its ravages. Some species of this family also live in fresh water. They are common on our shores.



THE WOOD-LOUSE MAGNIFIED.

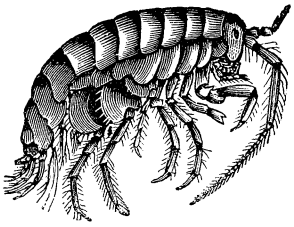
The last family, the *Oniscidæ*, including the well-known Wood-Louse, *Oniscus murarius*, and many similar animals, are characterized by the adaptation of their members to a terrestrial existence. Nearly all these animals live on land, in damp places, under stones, dead leaves, and moss; some of them, as the Common Sow-Bug, *O. asellus*, are not uncommon in cellars. When alarmed, they roll themselves up into a ball,

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presenting nothing but the smooth, convex surface of their scaly armor to the enemy. This family also includes the PILL-BUG, *Armadillo pillularis*.

ORDER 4. **AMPHIPODA.**

This order consists of animals mostly of small size, none of them exceeding two inches in length. They usually live free in the water or burrow in sand; a few species are parasitic upon fishes. The COMMON SAND-HOPPER, *Talitrus locusta*, which may be met with in thousands upon the sands of European shores, is a well-known example of this family. Although its length is not much more than half an inch, it can leap several inches into the air, and the facility with which it escapes pursuit by burrowing into the soft wet sand is truly wonderful. The BEACH-FLEA, *T. quadrifidus*, is found under stones and sea-weed on our coasts. The European species, *Gammarus pulex*, is found commonly in fresh water, and is scarcely inferior to its marine relative in agility. The *G. minus*, one-third of an inch long, and called *Fresh-water-Shrimp*, is a common American species, found under stones and pieces of wood.

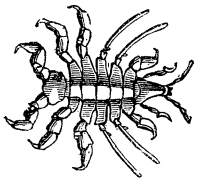


THE SAND-HOPPER MAGNIFIED.

ORDER 5. **LÆMODIPODA.**

This curious little order includes only two families. The *Cyamidæ*, or *Whale-Lice*, infest the different species of cetaceous mammalia. They often live upon the whales in such vast numbers that their victims may be recognized at a distance by the whitish tint of their skin. The WHALE-LOUSE, *Cyamus ceti*, is found on the whales along our coasts.

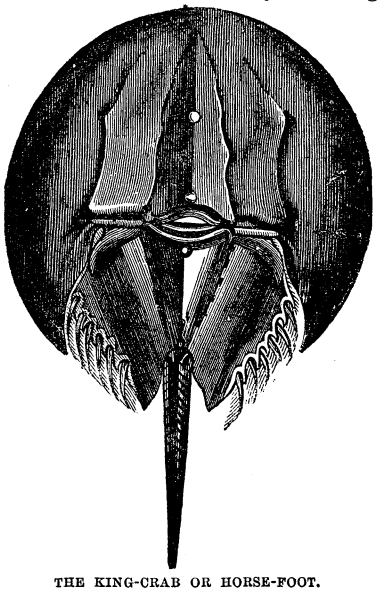
In the second family, the *Caprellidæ*, all the proportions of the body are reversed; instead of being broad and flat, as in the preceding, it is long, slender, and nearly cylindrical. The *Caprella geometrica* swims by alternate curvatures of the body; it is found among sea-weed and sponges, and walks like the caterpillars called *Measuring-Worms*. It is common on our coasts.



THE WHALE-LOUSE.

ORDER 6. **XYPHOSURA.**

This order consists only of a single genus, *Limulus*, the *King-Crab*, which, from the locality inhabited by the commonest species, is frequently termed the *Molucca Crab*. It is among the largest of crustaceous animals, sometimes measuring as much as two feet in length. The body is composed of two divisions—an anterior, crescent-shaped piece, or carapace, and a posterior, somewhat hexagonal piece, formed by the coalescence of the abdominal segments. From the posterior extremity of this second division of the body, projects a long, spine-like tail, which exhibits no trace of segmentation. The upper surface of the body is convex; the lower surface, on the contrary, is concave in the middle, forming a hollow, in which the feet are lodged. These curious animals appear to be confined to the coasts of the East Indies and America. The species common on our own shores, *Limulus Polyphemus* of Milne Edwards, is called *Horse-Foot*. It is often used for feeding hogs, and the shell is employed as a ladle. The French colonists of the south called it *Casserole-Fish* from its resemblance to a *saucepan:* the latter name is often given to it among us. The Indians used to point their arrows with the sharp horny tail.

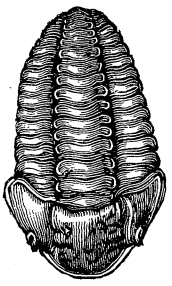


THE KING-CRAB OR HORSE-FOOT.

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ORDER 7. **PHYLLOPODA.**

This order includes the *Apodidæ*, in which the body is protected by a carapace which takes the form of a bivalve shell, and also the *Branchipodidæ*, which are without carapace. One species, *Branchipus stagnalis*, is often found in cart-ruts. This also seems to be the place for a family of fossil crustacea, the well-known Trilobites, *Trilobita*, of which vast numbers occur in some of the earlier strata of the earth's crust. Their general form is shown in the annexed figure of the *Calymene Blumenbachii;* they possessed well-formed, compound, faceted eyes, which are frequently well preserved in the fossil state. The body is usually divided into three regions, of which the first and last are commonly in the form of semicircular plates, while the middle portion exhibits distinct segmentation, and by its flexibility enabled the animal to double itself up in the manner of the common wood-louse. These animals are now quite extinct, although during the period of the deposition of the ancient strata in which their remains are found, they were almost the only representatives of the class Crustacea.



THE CALYMENE.

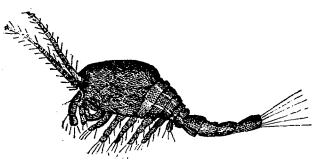
ORDER 8. **OSTRACODA.**

In this order, composed of animals generally of very minute size, the body, which strongly resembles that of the *Copepoda*, is always inclosed in a little bivalve shell, the feet and antennæ being protruded between the lower edges of the valves. These little shells so closely resemble those of minute bivalve mollusca, that those of some of the larger species have actually been described by conchologists as the coverings of animals belonging to that class. The antennæ are often curiously branched, and the hinder extremity is usually produced into a sort of tail, which is seen in constant action when the animal is in motion.

This order forms two families—the *Cypridæ*, in which the body is entirely inclosed within the shell, of which the genus *Cypris* is an example, and the *Daphniadæ*, in which the head is protruded beyond the shell. In the *Polyphemus*, belonging to the latter, the head, which is large, is almost entirely occupied by an enormous eye, giving the creature a most singular appearance.

ORDER 9. **COPEPODA.**

These are minute animals, with the body divided into segments. They appear to possess no distinct respiratory organs, and the ova are carried in sac-like organs attached to the abdomen of the mother. They occur in countless swarms in all waters, whether salt or fresh, and, minute as they are, one species is said to constitute the principal food of the Antarctic whale. The best-known form is the genus *Cyclops*, specimens of which may be found in every stagnant pool; it is the type of the family *Cyclopidæ*, characterized by the possession of a single eye. The species *Cyclops navicularis* is found in stagnant fresh water in the Southern States. A closely-allied species is found in Lake Ontario.



THE CYCLOPS.

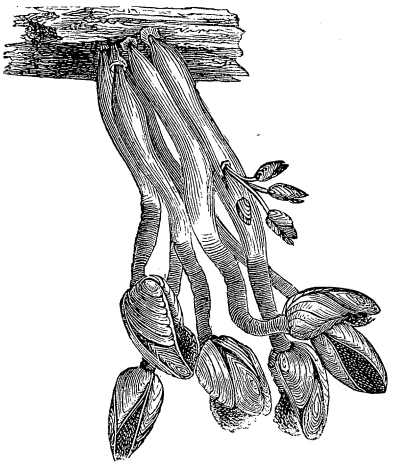
ORDER 10. **PARASITA.**

This order is composed of numerous small animals, which, in their young state, are furnished with distinct jointed limbs, antennæ, and eyes, organs which either disappear completely or become greatly modified as the animals approach maturity, when they attach themselves to fishes or other aquatic animals, and pass the remainder of their existence as parasites. There are several families: one species, the *Argulus foliaceus*, is very common upon various European freshwater fishes. The *A. catostomi* is found on the gill-covers of a species of sucker in Connecticut, and the *A. alosæ*, on the gills of the alewife in Massachusetts.

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ORDER 11. CIRRHOPODA.

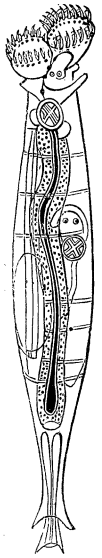
Cirrhopoda is derived from the Latin *cirrus*, a lock of hair, and the Greek *pous*, a foot. These, until recently arranged with the mollusca, are all marine animals, which, when mature, attach themselves to rocks or other submarine objects. The COMMON BARNACLE, *Lepas anatifera*, perhaps the best-known example of the order, generally selects floating objects for this purpose, and frequently covers the bottoms of ships to such an extent as even to impede their progress through the water. It adheres by a flexible stalk, which possesses great contractile power. The shell is usually composed of two triangular pieces on each side, and is closed by another elongated piece at the back, so that the whole consists of five pieces. The *Anatifa anserifera* of De Kay, and other species, are found on ships' bottoms at New York and other places in America. The *Sea-Acorns*, or *Balanidæ*, include the sessile species, whose curious little habitations may constantly be met with upon the rocks of the sea-shore, and not unfrequently upon many species of marine shells. There are several American species.



BARNACLES.

Class V. ROTIFERA.

These animals, called *Wheel Animalcules*, were formerly included among the Infusoria, but are now classed with the Articulata: they are chiefly known to us by the microscope, the largest being not over a tenth of an inch long, and many of them only one three-hundredth of an inch. They inhabit both salt and fresh water, and are distributed over nearly all parts of the world. They are not only numerous beyond all human conception, but they are divided into over fifty genera and two hundred species. Notwithstanding their minuteness, the careful studies of naturalists have made us acquainted with their structure and habits. They are generally of an elongated form, though some are nearly as wide as they are long. They are each provided with a rotatory organ, called a *wheel*, which consists of retractile fleshy lobes, covered with vibrating cilia, placed at the anterior extremity. By an apparently circular movement of these organs they produce a whirling vortex in the water, which brings to their mouths any minute animals which may be floating in the neighborhood. By this ingenious but curious contrivance these creatures obtain their food.



WHEEL ANIMALCULE.

It has been ascertained that they have a complicated muscular system, a stomach, and a nervous system; they are true hermaphrodites, and possess amazing power of reproduction. Ehrenberg states that in three days the progeny of a single specimen of *Hydatina senta*, which he had separated, amounted to no less than twenty individuals, a rate of increase which in ten days would produce more than a million of specimens. He adds that "if two, instead of four, were produced daily by each individual, a million would be called into existence in twenty days, and on the twenty-fourth day we should have sixteen millions seven hundred and seventy-seven thousand two hundred and sixteen animalcules!" But astonishing as is this increase, there is another fact equally wonderful, which is, that though these creatures only show life in water, they will revive after having long remained dried up with the sand. Professor Owen asserts that

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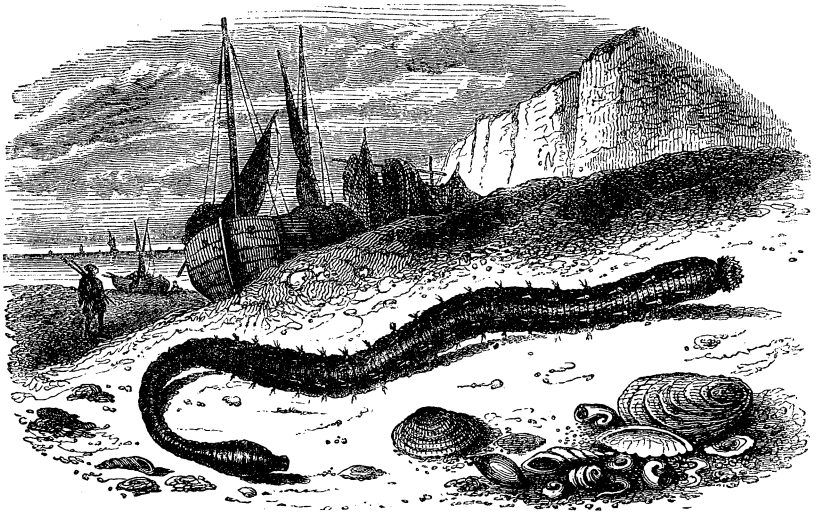
he has seen the revival of one of these little creatures, on being put in water, after having been four years thus completely desiccated! These animals comprise two orders, the *Natantia* and the *Sessilia.*

ORDER 1. **NATANTIA.**

This term means *swimming*, and is applied to those species of the class which are free and swim about from place to place. These have a sucker-like organ, or a small pair of forceps, at the tail, by which they are enabled to fix themselves when they wish to set their wheels in motion, in order to obtain food. They are divided into two families, the *Polytrocha* and the *Zygotrocha.*

ORDER 2. **SESSILIA.**

This term means *sitting*, and is applied to those species of the class which remain fixed and stationary. They include two families, the *Flosculariдæ* and the *Megalotrochidæ.*



THE LOB-WORM.

Class VI. ANNELIDA.

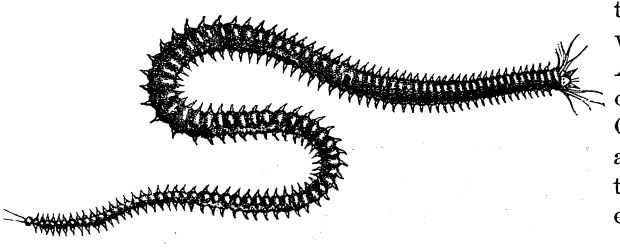
In the *Annelida*, which include the *Red-blooded Worms*, the division of the body into segments is usually distinctly recognizable; the majority live in water, or in damp situations; a very few only are parasitic in their habits. In most the head is distinctly marked, and furnished with organs of sense, such as eyes, tentacles, and in some instances auditory vesicles. The nervous system, in the higher forms, exhibits the articulate type of structure very distinctly; it usually consists of a series of ganglia running along the ventral portion. The digestive apparatus consists of a straight intestine, running through the body from one extremity to the other. The mouth is usually armed with jaws, and the opposite extremity of the intestinal canal always terminates in an anal opening. The sexes are usually distinct, although a few, as the leeches and earth-worms, are hermaphrodites. Some species appear to propagate by spontaneous division, and many of them can reproduce parts lost by accidental injury. These animals include four orders, the *Errantia*, *Tubicola*, *Scolecina*, and *Suctoria.*

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ORDER 1. **ERRANTIA.**

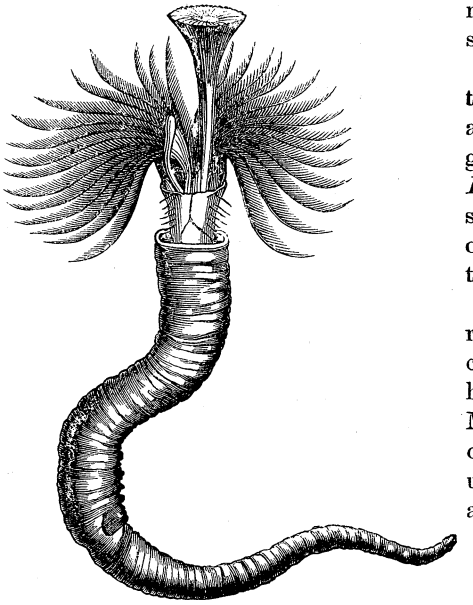
This term means *wandering*, and is applied to numerous species, of which the LOB-WORM or LUG-WORM, *Arenicola piscatorum*, is a common example. This animal, much used by fishermen for bait, is nearly a foot long, and is found on sandy parts of the coast, where it bores into the sand left wet by the retiring tide; its head is large and rounded, quite destitute of eyes or tentacula, and furnished with a short, unarmed proboscis. The feet are very small, and confined to the anterior part of the body, while the branchial tufts, which are of considerable size, are placed on each side of the middle segments.

The family of *Aphroditidæ*, some species of which are known as *Sea-Mice*, includes certain marine animals of great beauty. In these worms the body is generally broad or ovate, the head small, and furnished with very short tentacula; the feet are large, with immense tufts of bristles and spines, often of the most remarkable forms, and exhibiting the most brilliant metallic colors. Each of these hairs is retractile within a horny sheath, which serves to protect the soft parts of the animal from injury by its own weapons. The COMMON SEA-MOUSE, *Aphrodita aculeata*, is oval-shaped, six or eight inches long, two or three wide. Cuvier says that the covering of this animal does not yield in brilliancy to the plumage of the humming-birds, or even the most shining gems.



THE NEREIS.

The family of *Nereidæ* includes some elongated and distinctly annulated worms, which possess a well-developed head, furnished with tentacles and eyes, and a mouth with a proboscis, which is sometimes furnished with two or four teeth. The cirri or tentacles attached to the feet are often of considerable length, and sometimes even annulated. The animals frequently present an appearance strongly resembling that of the more elongated Myriapoda.



THE SERPULA CONTORTUPLICATA.

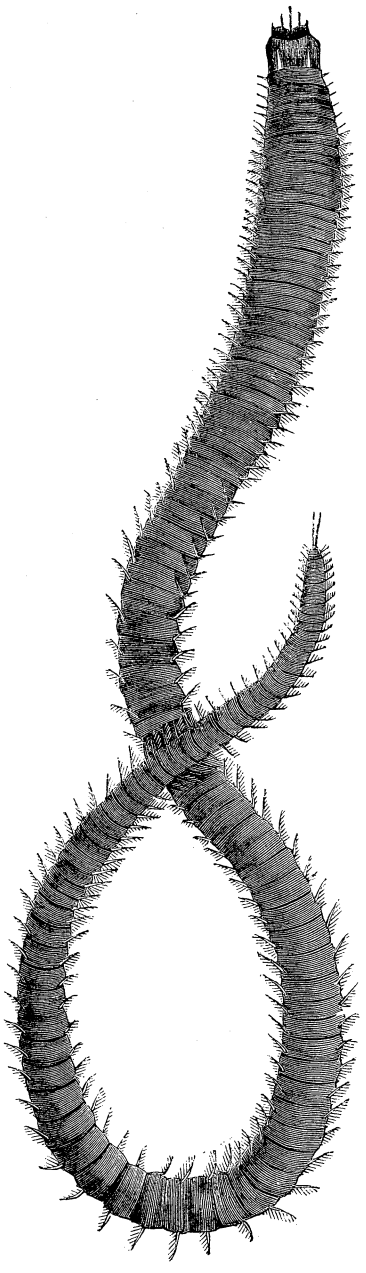
In the next family, the *Eunicidæ*, the branchial tufts are of considerable size, and the mouth is armed with from seven to nine toothed jaws. This group includes some species of large size; the *Eunice gigantea*, which inhabits the West Indian seas, grows to the length of four or five feet; and others, found in the Southern Ocean, are said to attain double that length.

Zoologists also place in this order a curious terrestrial annelide, found in the West Indies, and called *Peripatus*. In its general appearance it exhibits a most striking resemblance to some of the Millepedes. The *Leodice antennata* has the organs of locomotion attached to each segment: they are usually in the form of movable spines, and are used as oars.

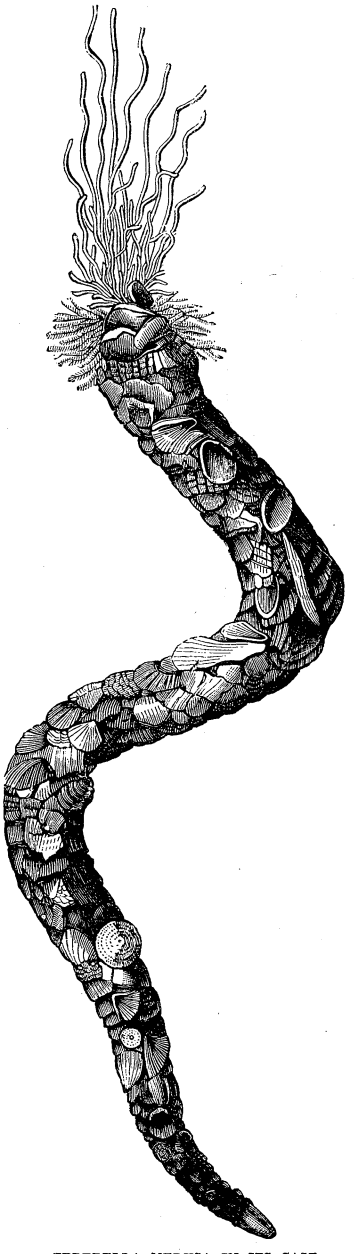
ORDER 2. **TUBICOLA.**

The worms belonging to this order are all marine, and are distinguished by their invariable habit of forming a tube or case, within which the soft parts of the animal can be entirely retracted. This tube is usually attached to stones or other submarine bodies. It is often composed of various foreign materials, such as sand, small stones, and the débris of shells, lined internally with

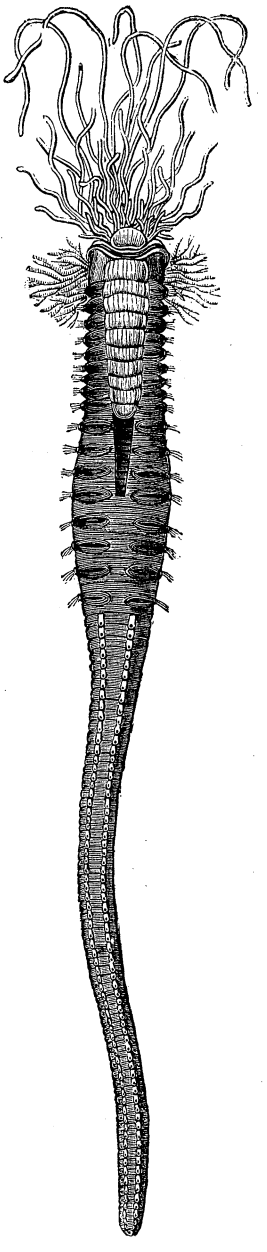
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THE LEODICE ANTENNATA.



TEREBELLA MEDUSA IN ITS CASE.



OUT OF ITS CASE.

a smooth covering of hardened mucus; in others, it is of a leathery or horny consistency; and in some it is composed, like the shells of the mollusca, of calcareous matter secreted by the animal. The annexed engravings show one species, the *Terebella Medusa*, with incrustations and also without, that is, in its natural state.

All these worms are unisexual. They deposit their eggs in a mass of mucus, which usually clings to the tube of the parent animal.

The *Serpulæ*, which form irregularly twisted calcareous tubes, often grow together in large masses, generally attached to shells and similar objects; while those genera which, like the *Terebella*, build their residences of sand and stones, appear to prefer a life of single blessedness.

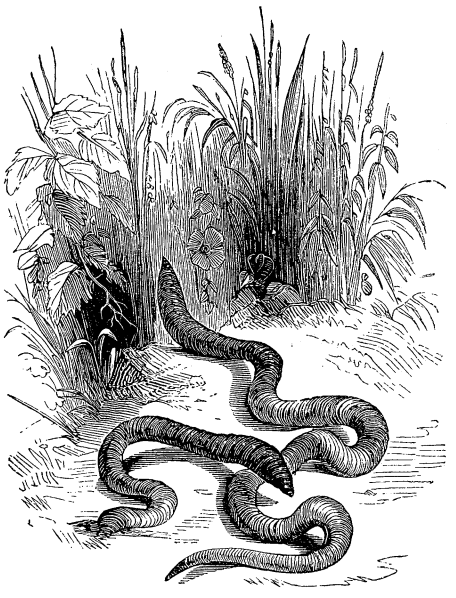
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The curious little spiral shells, often seen upon the fronds of sea-weeds, are formed by an animal belonging to this family, the *Spirorbis*.

The *Hermellidæ*, some of which live among the oyster-beds, and often do much mischief by the increase of their masses of tubes, also belong to this order.

ORDER 3. SCOLECINA.

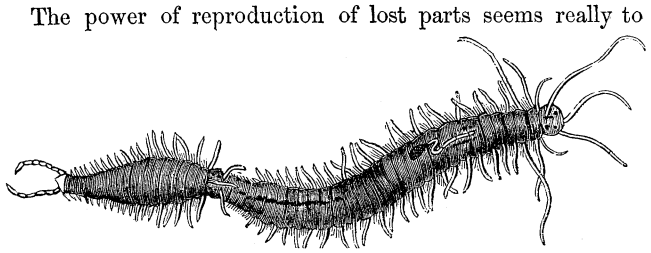
Of this order, deriving its name from *Skolex*, a worm, we have well known examples in the *Earth-Worms* common in gardens and fields. The bodies of these animals are of a cylindrical form, somewhat pointed at the anterior extremity, and usually a little flattened at the tail. The skin is tough, and divided into numerous segments by transverse wrinkles, and the organs of motion are reduced to the form of a double row of bristles, running down the lower surface of the body, which, instead of being placed, as in the preceding orders, upon prominent lobes of the skin, are usually capable of being retracted within small hollows when not in use. The mouth is unarmed, and the intestine runs straight through the body. The blood is red. Like the leeches, these worms are furnished with ciliated canals, which have been supposed to serve as organs of respiration; but their real destination appears to be still uncertain. Like the leeches, also, they are all hermaphrodites.



EARTH-WORMS.

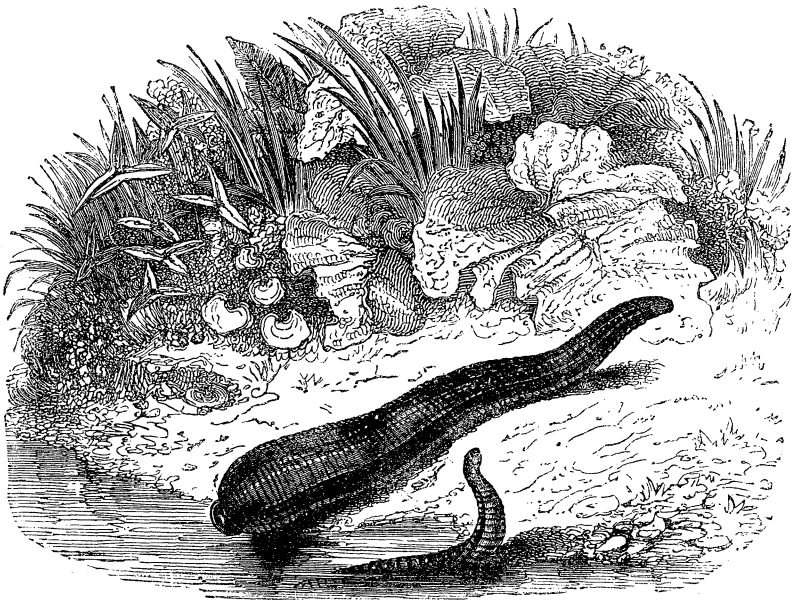
This order contains two families—the *Lumbricidæ* or *Earth-Worms*, and the *Naididæ*. The former are too well known to require extended description; they possess no distinct head, and are quite destitute of eyes: their bristles are hooked, and placed in little tufts in pits on the lower surface, whence they can be exserted when the animal requires their assistance. They live in holes in moist earth, and are said to be predaceous animals, although popular belief charges them with the destruction of the roots of plants. It is generally supposed that the earth-worm may be propagated by division; but this does not seem to be the case. It is said, however, that if it be divided across the middle, the part bearing the head will develop a new tail, although the tail part will soon die; and that, if the head be cut off, the body will form a new head; but it appears that *both* portions never survive this mutilation.

The power of reproduction of lost parts seems really to exist in the *Naididæ;* these also propagate by a kind of gemmation, one seeming to grow out of the other, as represented in the annexed engraving. Three young ones are sometimes seen attached to and growing upon the mother, at the same time. It appears, however, that the tail of the original Nais becomes actually the tail of its offspring, by which means, as Jones remarks, "this part of the animal may be said to enjoy a kind of immunity from death." These animals live principally in the mud of fresh-water ponds and rivers. In their form they resemble the common earth-worm; but their bodies are furnished, besides the ventral bundles of bristles, with a series of long spines on each side. They generally have two distinct eyes, and the mouth is sometimes armed with a long proboscis.



NAIS.

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THE LEECH.

ORDER 4. **SUCTORIA.**

The animals belonging to this order, of which the *Common Leech* is a familiar example, are characterized by the total deficiency of any lateral appendages, their motions being effected by undulations of the body while swimming, or by the alternate attachment of the sucking discs with which the two extremities of their bodies are usually furnished. They all appear to live by sucking the blood of other animals, and, for this purpose, the mouth of the leech is furnished with an apparatus of horny teeth, by which they bite through the skin. There are several species, nearly all of which are hermaphrodite. The deposition of the eggs is attended with some very singular circumstances. At the period of oviposition a peculiar gelatinous band is produced round the anterior part of the body. The leech lays its eggs in this gelatinous matter, and when all are deposited, it withdraws its body from the band, which then closes up, and forms a complete capsule, within which the eggs are inclosed. It appears, however, that the leech also sometimes produces a compound egg, formed of a transparent membrane, full of a liquid in which little globules soon begin to appear; these globules are, in fact, so many germs of leeches, and during development take the form of little worms, which soon leave the egg by an opercular hole at its extremity.

The use of the Common Leech, *Sanguisuga officinalis*, for medical purposes is enormous; three millions are annually used in Paris, and one hundred millions in France; seven millions two hundred thousand are annually imported by four dealers in London. The English leeches are chiefly derived from Sweden, Poland, and Hungary; the French from the frontiers of Turkey and Russia.

The small leeches, about an inch and a half long, which infest damp places in Ceylon, often creep upon the legs of travelers, who are first warned of their presence by the flow of blood through their clothes. The soldiers of Napoleon in Egypt were tormented by leeches thronging the pools, which fixed themselves in their mouths and nostrils as they stooped to drink.

The species of the genus *Piscicola* live as parasites on fresh-water fishes.

The animals of the genus *Sipunculus* and their allies, form the order of *Gephyrea* of some naturalists; they are marine, their bodies are cylindrical, and their habits are similar to those of the lob-worm. They are destitute of eyes and other organs of sense.

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Class VII. NEMATELMIA.

The term *Nematelmia* signifies *Round-Worms*, and includes species of a more or less elongated, cylindrical form, with a thick, strong, and wrinkled skin, which gives the body an annulated appearance. As far as our present knowledge goes they are unisexual. They not only inhabit the intestines of other animals, but many species are also to be met with in the interior of completely closed organs, to which they must have obtained access in their earliest stages. They form three distinct orders, the *Nematoidea*, the *Gordiacea*, and the *Acanthocephala*.

ORDER 1. NEMATOIDEA.

This term means "*resembling a filament*," and the order consists principally of worms parasitic in the intestines of other animals. It includes the common *Round-Worm* or *Ascaris* of the human subject, as well as the little *Thread-Worm*—*Oxyuris*—which is often so troublesome to children. The *Strongylus gigas* sometimes attains a length of two or three feet and the thickness of a man's little finger, and usually inhabits the kidneys of swine, but sometimes finds its way into the same organ in man. It is often fatal to its host.

This order also includes the dreaded GUINEA-WORM, *Filaria medinensis*, which appears to occur in most parts of tropical Africa. It lives in the cellular tissue beneath the skin, and between the muscles of man, confining its attacks principally, though not exclusively, to the lower extremities, where it often produces considerable pain. It is said occasionally to attain a length of twenty or thirty feet, but its average length is five or six.

In this order we also place the *Anguillulidæ*, the so-called *Eels* of paste and vinegar. These are minute, thread-like worms, exhibiting distinct digestive and generative organs, and which occur often in great numbers in putrefying substances.

ORDER 2. GORDIACEA.

The *Gordiacea*, or *Hair-Worms*, are at once distinguishable by the extraordinary length of their bodies, which frequently present a close resemblance to a horse-hair; so close, indeed, that in former times the popular belief ascribed their origin to the introduction of horse-hairs into the water in which they were found. They live as parasites in the bodies of various species of insects. They sometimes become completely dried up, and appear dead, but come to life again and start off with great activity when refreshed by a shower of rain.

ORDER 3. ACANTHOCEPHALA.

This order, which includes only a single genus, is composed of parasitic worms often of considerable size, which find their habitation in the intestines of various animals, especially fishes. One species, the largest in the order, is common in the intestines of swine, where it sometimes attains a length of eighteen inches.

Class VIII. PLATYELMIA.

The *Platyelmia*, or *Flat-Worms*—a branch of the *Entozoa**—include three orders, the *Planarida*, the *Trematoda*, and the *Cestoidea*.

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* The term *Entozoa* is from the Greek term *entos*, within, and *zoon*, an animal; as used by naturalists it includes generally, the internal parasites.

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ORDER 1. **PLANARIDA.**

This order includes most of the free Platyelmia, which are of an oval or elliptical form, and are very commonly furnished with an extensible proboscis. They are of a gelatinous consistency, and can reduce their whole substance to the form of a lump of jelly, in which condition they occasionally force themselves rather disagreeably upon the notice of some incautious water-cress eaters. They inhabit both salt and fresh water, where they swim about rapidly by an undulating movement of the body, in the manner of the leech, and creep with great ease upon stones and aquatic plants. They are generally of small size, but exceedingly voracious.

In South America, Dr. Darwin observed some terrestrial animals which approached the Planarida very closely in their characters; they lived among rotten wood, upon which they appeared to feed, and were marked on the back with stripes of bright colors.

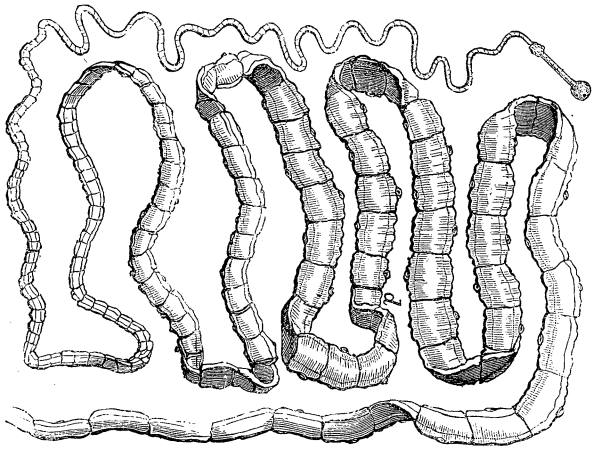
The family of *Nemertidæ*, or *Ribbon-Worms*, is composed of animals with elongated, ribbon-like bodies, possessing a protrusible proboscis, and sometimes attaining a length of fifteen feet. One species, the *Borlasia*, is found on the coasts of England and France. This formidable worm lies coiled up beneath stones during the day, but goes about at night in search of its prey.

ORDER 2. **TREMATODA.**

These animals are all parasitic. One of the most noted species is the Fluke, *Distoma hepaticum*, which infests the livers of sheep. Other species live in the intestines, the brain, and even the eyes of other animals.

ORDER 3. **CESTOIDEA.**

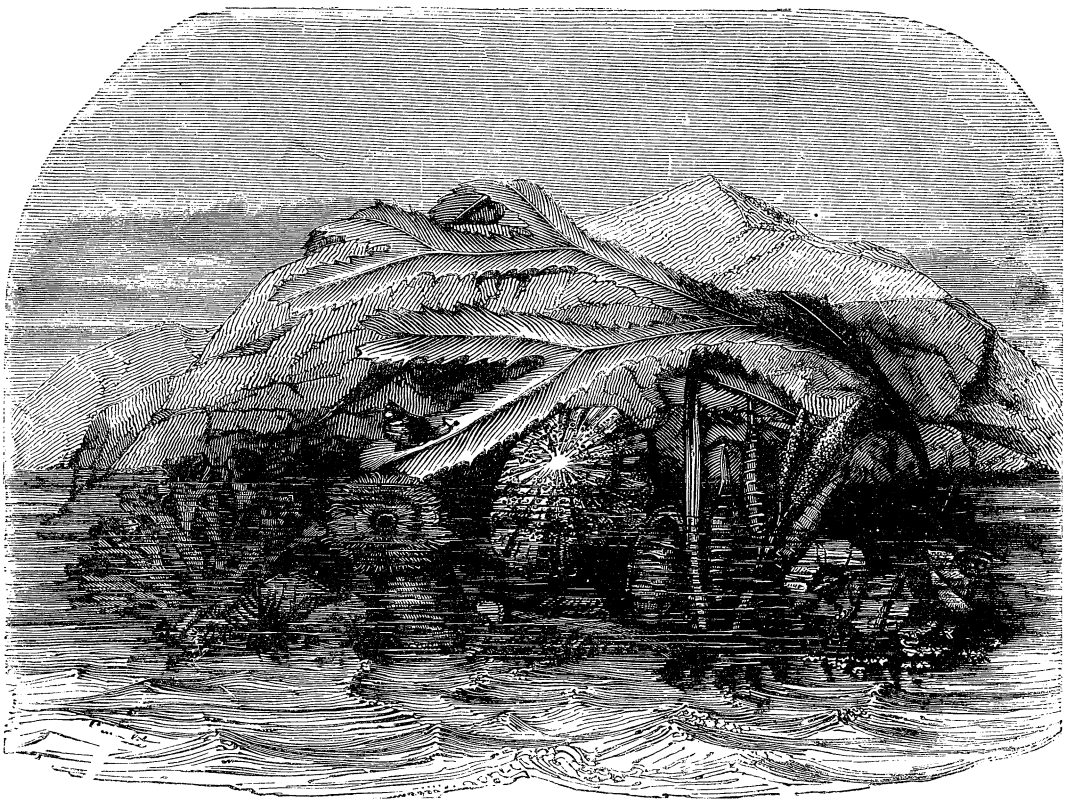
The general appearance of the animals belonging to this order is well shown in the annexed figure, which represents the Common Tape-Worm, *Tœnia solium*, of the human intestines. The body is composed of numerous joints or segments, each one resembling the others; these are often several hundreds in number, and the animal sometimes attains a length of upwards of ten feet. It is furnished with hooks and suckers at the head, by means of which it anchors itself to the intestines of its victims. It has no mouth or digestive organs; so that it obtains its nourishment by absorption through the skin. One of the most curious facts in regard to this species is, that in different animals it assumes entirely different forms. In one state it is called *Cœnurus cerebralis*, and is found in the brains of sheep, and often inflicts very great injury.



THE COMMON TAPE-WORM.

The reproduction of this species is equally remarkable. Each segment of the body is provided with male and female sexual organs; when these have reached maturity, the segment is cast off to seek a new place in which its ova may be developed. To aid in this process the joints, when cast off, are endowed with a considerable power of motion, and will live for several days when placed in favorable circumstances. Thus it appears that nature has manifested the same care and displayed the same ingenuity in providing for the wants and in maintaining and multiplying the species of these hideous and destructive worms, as in the highest forms of animal life.

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THE SEA-SHORE.

Division IV. RADIATA.

Once more we return to the Sea—for the whale, the porpoise, and their allies, the finned and scaled fishes of a thousand forms, the myriad hosts of the shelled mollusca, the multitudinous families of crabs, lobsters, and other crustacea which inhabit it, have not yet completed the list of animal wonders in this broad and boundless element. We now stand upon the sea-shore and behold another form of creation—the *Radiata*, of which the star-fishes, corals, and madrepores are familiar types. We have already described the structure of this Division of the Animal Kingdom, Vol. I., page 18, and at pages 29 and 30 have presented our Classification of it. What we have still to add must be brief, but we shall offer abundant evidence that here, as everywhere else in the works of Nature, there are exhaustless stores of curious and interesting knowledge. Though we certainly find that we are descending, step by step, from the higher to the lower forms of existence, and that we now approach animals which seem to put on the semblance of plants and stones—many of them in fact taking their names from these objects—we shall discover that from them the ocean chiefly derives the phosphoric glow which breaks in sparks and flashes in the wake of the ship; from them come some of the chosen ornaments of beauty; from their labors have sprung up some of the great islands of the sea, now crowned with all the glories of tropical vegetation. All the monuments of man—his cities, roads, edifices—from the beginning of his history, are but as insignificant pebbles in comparison with the works of some of the very humblest of these creatures we are about to contemplate.

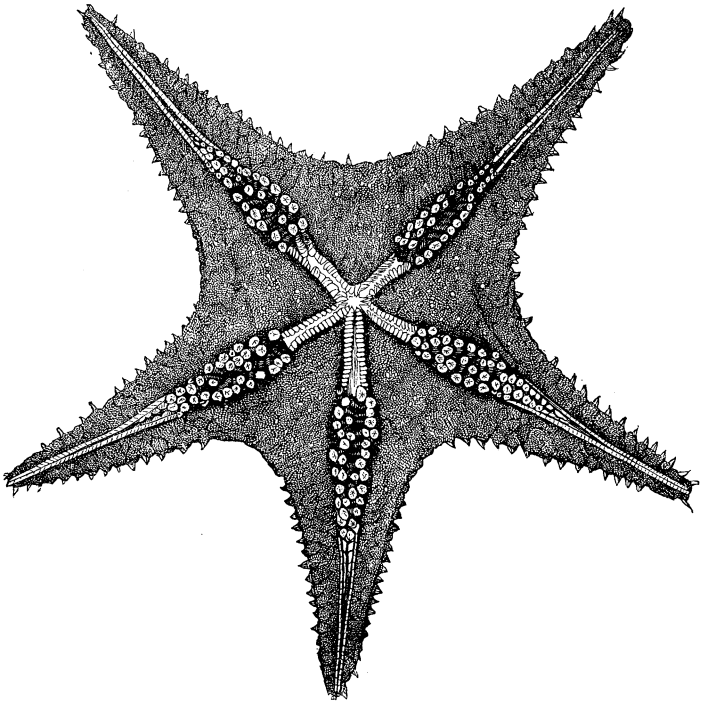
In short, we now enter that wonderful domain which the poet has so vividly described:

"Deep in the wave is a coral grove,
Where the purple mullet and gold-fish rove;
Where the sea-flower spreads its leaves of blue,
That never are wet with the falling dew;
But in bright and changeful beauty shine,
Far down in the green and glassy brine.

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The floor is of sand like the mountain drift
And the pearl-shells spangle the flinty snow:
From coral rocks the sea-plants lift
Their boughs when the tides and billows flow.
The water is calm and still below,
For the winds and waves are absent there,
And the sands are bright as the stars that glow
In the motionless fields of upper air:
There, with its waving blade of green,
The sea-flag streams through the silent water,
And the crimson leaf of the dulse is seen
To blush like a banner bathed in slaughter:
There, with a light and easy motion,
The fan-coral sweeps through the clear deep sea;
And the yellow and scarlet tufts of ocean
Are budding like corn on the upland lea;
And life, in rare and beautiful forms,
Is sporting amid those bowers of stone,
And is safe when the wrathful spirit of storms
Has made the top of the ocean his own.
And when the ship from his fury flies,
When the myriad voices of ocean roar,
When the wind-god groans in the murky skies,
And demons are waiting the wreck on shore—
Then far down in the peaceful sea,
The purple mullet and gold-fish rove,
Where the waters murmur tranquilly
Through the bending twigs of the coral grove."

The *Radiata*—so called from their radiate form, and formerly denominated *Zoophytes*, or Animal Plants—are divided into five classes: *Echinodermata*, *Siphonophora*, *Ctenophora*, *Discophora*, and *Polypi*.



STAR-FISH: UNDER SIDE, SHOWING THE AMBULACRAL APERTURES.

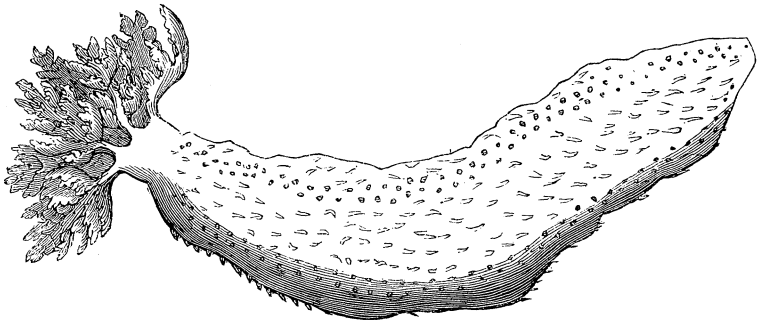
Class I. ECHINODERMATA.

This term is derived from the Greek *echinos*, a spine, and *derma*, skin; the animals of this class are distinguished for the structure of their skin, which generally presents a somewhat leathery consistence. The different species vary greatly in their forms, though they usually present a radiate arrangement in their parts. This system is conspicuous in the star-fishes, the number five, in the distribution of the rays of these curious species, being more or less traceable in the forms of nearly all those belonging to the class. Their organs of motion are similar, consisting of a multitude of small feet called *ambulacra*, which are protruded through a number of perforations left for this purpose in their calcareous coverings. The existence of a nervous system in these animals is generally admitted by naturalists; they are all furnished with distinct organs of digestion and circulation, but it is doubtful if they possess organs of special senses. The sexes are

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separate; the reproduction is attended with very curious transformations. They generally live on mollusca and other animals found in the sea.

The animals of this class are divided into four orders, *Holothurida*, *Echinida*, *Stellerida*, and *Crinoidea*.

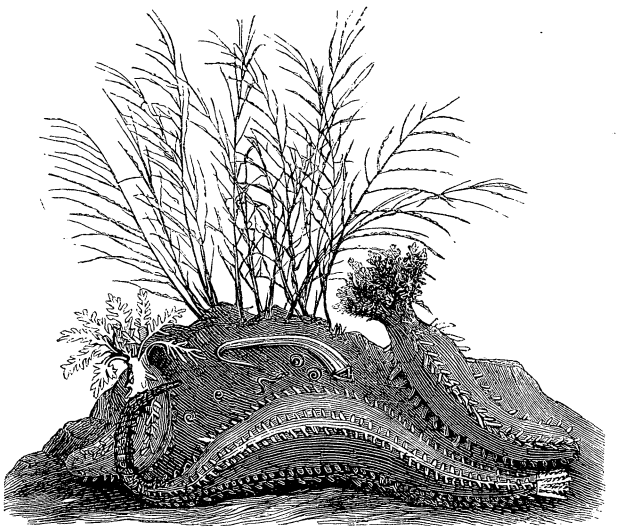


THE COMMON SEA-CUCUMBER.

ORDER 1. HOLOTHURIDA.

The animals of this order, called *Sea-Cucumbers*, are covered with a very elastic, leathery skin, kept moist by mucus that exudes through the pores; they have a somewhat worm-like appearance, the radiate structure being only visible in the tentacles which usually surround the mouth. The ambulacra, though short, resemble those of the other Echinodermata in their number and action.

The Sea-Cucumbers are of various forms, some of the species being found in nearly all seas. They generally live among sea-weed or in mud, and are supposed to seize their prey by their tentacles. They have the power of elongating and contracting their forms so as at one time to appear like worms, and at another to assume the shape of an hour-glass. One of the largest species, the GREAT SEA-CUCUMBER, *Cucumaria frondosa*, found in European seas, is a foot long. The ANGULAR SEA-CUCUMBER, *C. pentactes*, is also a European species, with double rows of warty suckers. There are many other species, common in the Atlantic and other seas, some of which are eaten; the TREPANG, *Holothuria edulis*, is an article of luxury among the Chinese. It is very abundant on the north coast of New Holland, and is collected there by the Malays in large quantities, dried, and packed up in bags for the Chinese market. The Malays and Chinese meet at the Island of Macassar, where the principal trade in this delicacy is carried on; and the quantity annually brought to that place by the fishermen is said to amount to upwards of four hundred tons. The price varies according to quality, from eight dollars to one hundred and fifteen dollars per *pecul* of one hundred and thirty-three pounds.

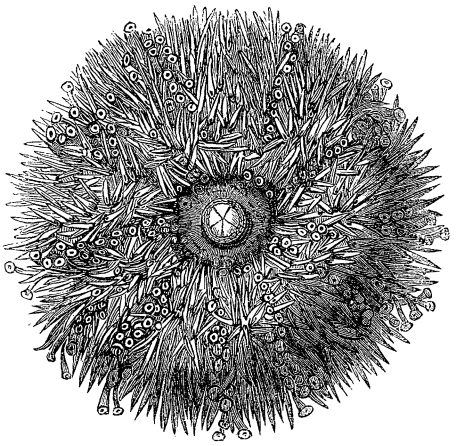


THE ANGULAR SEA-CUCUMBER.

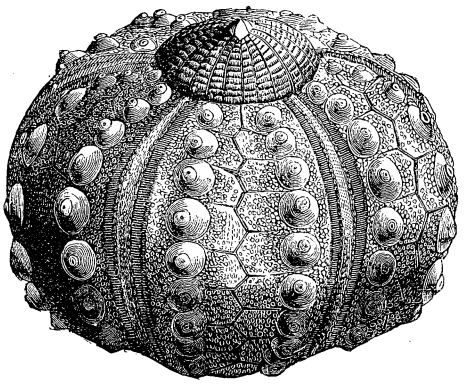
ORDER 2. ECHINIDA.

The animals of this order are covered with calcareous plates, forming a convex shell, more or less globular, with an opening at each end. The division into five parts is as distinct here as in the star-fishes, notwithstanding the total absence of arms, the holes through which the

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SEA-URCHIN: ECHINUS ESCULENTUS.



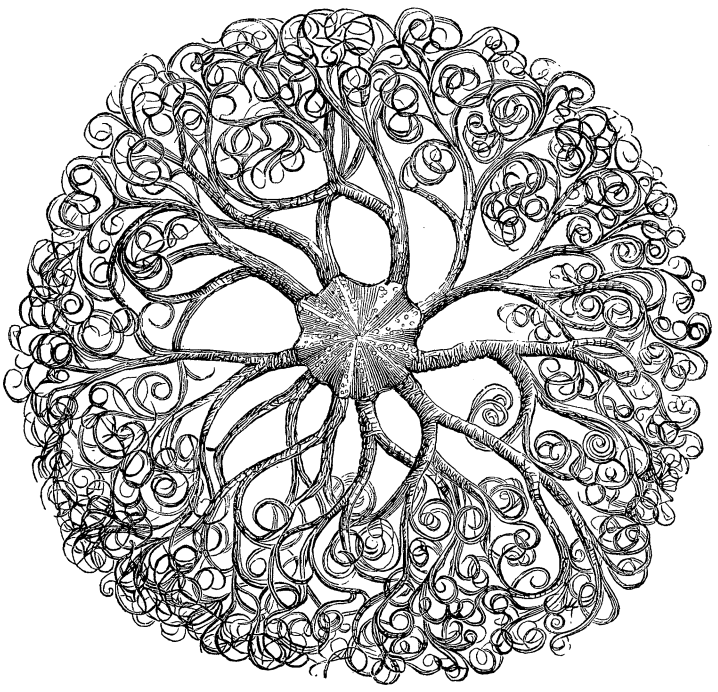
SHELL OF SEA-URCHIN WITHOUT THE SPINES.

little sucking feet, or ambulacra, are protruded, being arranged upon five rows of plates. The mode in which the capacity of the shell is increased is exceedingly curious and interesting. It is entirely covered by a skin of greater or less thickness, and it appears that, in spite of the close proximity of the edges of the plates, there is yet room for the passage of a minute layer of skin through all their interstices. It is in this that the deposition of calcareous matter takes place, so that, instead of adding fresh matter to the shell only at the oral aperture, as in the Mollusca, the animal increases the size of its domicile in proportion to its growth, by continual additions to the edge of every plate of which it is composed. New plates are also often added in the neighborhood of the superior orifice. Next to this peculiarity in the form of the shell, the most striking character of the Echinida consists in the numerous spines, frequently of large size, with which the shell is covered. These are articulated to the numerous tubercles presented by the surface of the shell, the base of the spines being hollowed for the reception of the convex surface of the tubercle—in fact, forming a kind of ball-and-socket joint. In consequence of this mode of attachment, the spines possess a considerable power of movement; they serve to bury their owner in the sand when circumstances require this concealment; and some species appear by the same means, to excavate hollows even in hard rocks. The spines with the ambulacra are used for locomotion, so that these creatures climb rocks and thus reach the coralines and shell-fish on which they feed.

The most remarkable family of the Echinida are the *Sea-Eggs* or *Sea-Urchins—Cidaridæ*: they consist of several species, somewhat varying in form, some being nearly flat, some oval, some heart-shaped, and some like the *Echinus esculentus*, resembling an orange in shape. The globular crest of this animal is made up of several hundred polygonal pieces of different sizes, of every variety of outline, and so accurately fitted to each other that the lines uniting them are nearly imperceptible. The complicated structure of these creatures is calculated to excite profound astonishment. "In a moderate-sized urchin, that is, about a foot in circumference," says Forbes, "I reckoned sixty-two rows of pores in the ten avenues. Now as there are three pairs of pores in each row, their number multiplied by six, and again by ten, gives the great number of three thousand seven hundred and twenty pores; but as each sucker occupies a pair of pores, the number of suckers would be half that amount. There are above three hundred plates bearing on its surface four thousand spines, each having a free socket movement!"

The Urchins are common in the Atlantic, and many have been found and described on the British coasts. According to Forbes there are the various kinds called the PIPER, *Cidaris papillata:* the COMMON EGG-URCHIN, *Echinus sphæra:* FLEMING'S EGG-URCHIN, *E. Flemingii:* the PURPLE EGG-URCHIN, *E. lividus:* the SILKY-SPINED EGG-URCHIN, *E. neglectus:* the GREEN-PEA URCHIN, *Echinocyamus pusillus:* the CAKE-URCHIN, *Echinarachnius placenta:* the HEART-URCHIN or MERMAID'S HEAD, *Amphidotus cordatus*, &c., the last being the commonest European species, and often called *Child's Head Urchin*, *Hairy Sea-Egg*, &c. This is of a yellowish-white color, and measures about one inch and a half in diameter. Several species of Echinus are eaten.

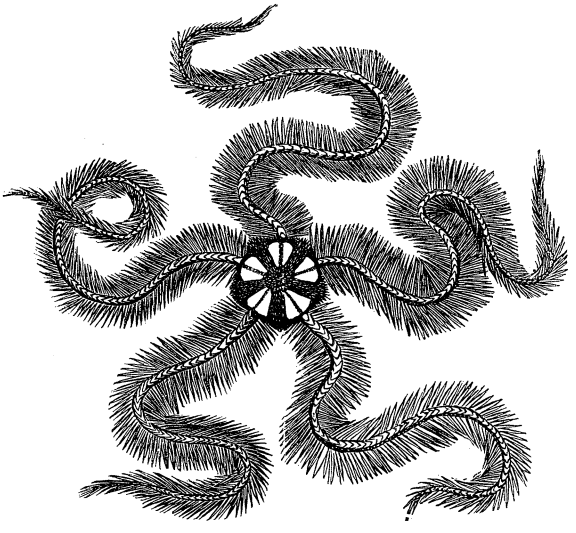
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THE SHETLAND ARGUS.

ORDER 3. **STELLERIDA.**

This order is composed of animals with a flattened and more or less pentagonal body, several families bearing five arms of variable length. The mouth opens in the center of the lower surface of the disc, and the anus, when present, is always situated on the back. In the neighborhood of the mouth some curious prehensile organs are always to be found, which, from the peculiarity of their structure and actions, have been regarded as independent parasitic organisms, and described as such under the name of *Pedicellariæ*. They stand upon little tubercles, and consist of a long calcareous stalk, which bears at its extremity a singular forceps of three or four pieces. These are continually opening and closing, apparently for the capture of floating particles of food, and, singularly enough, they continue their movements even after the death of the animal. The skin is coriaceous, and the calcareous matter is deposited in it in separate plates, which allow considerable flexibility to the whole body; along the lower surface of each arm runs a very distinct furrow, from which the ambulacra are protruded.



THE COMMON BRITTLE-STAR.

THE EURYALIDÆ.

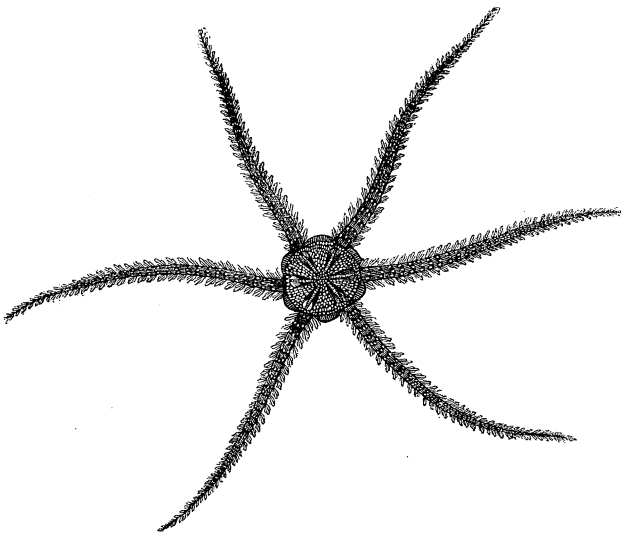
The *Stellerida* are usually divided into three families. The first, the *Euryalidæ*, have the arms distinctly separated from the body, always much branched, and usually furnished with cirri, producing the confused and tangled appearance which has caused them to be compared to and named after the

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Gorgon's Head, with its snaky locks. These animals, which swim with outspread arms, and capture their prey by involving it in their numerous branched rays, are principally found in the tropical seas, although some species exist even in the icy waters of the Arctic regions. They are all rare. The SHETLAND ARGUS, *Astrophyton scutatum*, usually more than a foot across, is sometimes found on the British coasts.

THE OPHIURIDÆ.

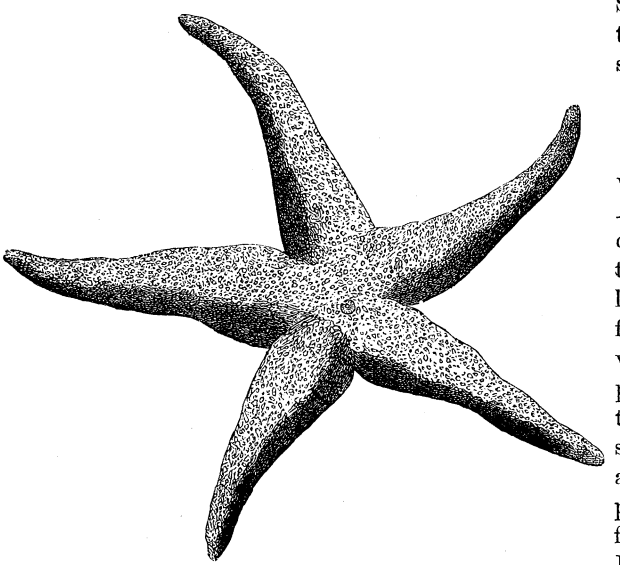
The *Ophiuridæ*, so called from the resemblance of their arms to serpents' tails, forming the second family, derive their name from the Greek *ophis*, a snake, and *oura*, a tail. The body consists of a roundish disc, furnished with five or more long simple arms, edged with movable spines, which have no furrow for the protrusion of the ambulacra. They pass under the popular names of *Brittle Stars* and *Sand-Stars*. They are exceedingly plentiful in most seas, and their fossil remains occur in all the more recent marine strata of the earth's crust. Among the several species found in the British seas is the COMMON BRITTLE-STAR, *Ophiocoma rosula*, which displays the most varied hues, arranged in beautiful patterns. Like the other Brittle-Stars, it breaks in pieces when alarmed or irritated; "touch it, and it flings away an arm; hold it, and in a moment not an arm remains attached to the body." Among the British species are the COMMON SAND-STAR, *Ophiura texturata*, and the LESSER SAND-STAR, *O. albida*, which have also the brittleness of the species just described.



SAND-STAR.

THE ASTERIDÆ.

We now come to the *Asteridæ*, of which the *Star-Fish*, popularly called *Five-fingered Jack*, so abundant on our coasts, is an example. In this family the arms appear to be merely prolongations of the disc; they are usually five in number, and the plates from which the ambulacra are exserted are placed in deep furrows, which run along the lower surface of the arms. In some species the arms are very short, and in others the animal forms a flat pentagonal disc, with five ambulacral furrows excavated in its lower surface. In the center of this the mouth is situated, and the ramifications of the stomach extend to a greater or less distance into the arms. Most of the species of this family possess an anal aperture; but this is wanting in some. These animals feed on worms and various kinds of shell-fish, sometimes clasping and sucking out the flesh of the latter; they often accom-

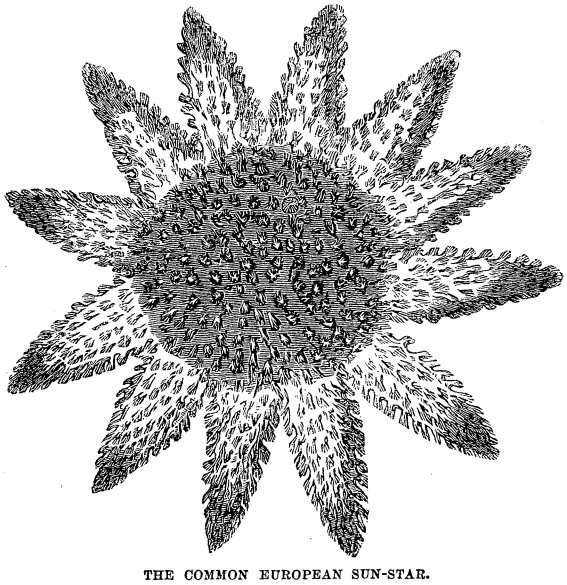


FIVE-FINGERED JACK.

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plish this object by inserting a sucker between the valves. Occasionally, it is said, one of these thieves has his finger caught in the shell, in which case he snaps it off, preferring this sacrifice to remaining in captivity. These creatures, like the brittle-stars, can reproduce their limbs which happen to be broken off. In England these animals have the various names of *Cross-Fish, Five-Fingers, Devil's Fingers, Devil's Hands*, &c.

Forbes describes several species of Asteridæ on the British coasts. Among them are the SPINY CROSS-FISH, *Uraster glacialis*, its expanded rays measuring twenty inches: the COMMON CROSS-FISH, *U. rubens*, its rays measuring from nine to twelve inches: the VIOLET CROSS-FISH, *U. violacea:* the ROSY CRIBELLA, *Cribella rosea:* the EYED CRIBELLA OR FIVE-FINGERED JACK, *C. oculata:* the BIRD'S FOOT SEA-STAR, *Palmipes membranaceus:* the KNOTTY CUSHION-STAR, *Goniaster equestris:* the BUTTHORN, *Asterias aurantiaca:* and the LINGTHORN, *Luidia fragillissima*. The latter appears not only to have the power of casting away its arms entire, but of breaking them voluntarily into little pieces. Forbes gives an amusing description of one which he caught in a dredge. "Cautiously and anxiously," he says, "I sank my bucket to a level with the dredge's mouth, and proceeded in the most gentle manner to introduce Luidia to the purer element. Whether the cold air was too much for him, or the sight of the bucket too terrific, I know not, but in a moment he proceeded to dissolve his corporation, and at every mesh of the dredge his fragments were seen escaping. In despair I grasped at the largest, and brought up the extremity of an arm with its terminating eye, the spinous eyelid of which opened and closed with something exceedingly like a smile of derision."



THE COMMON EUROPEAN SUN-STAR.

Some of the *Sun-Stars* are very beautiful species; the PURPLE SUN-STAR, *Solaster endeca*, has eight rays, and the COMMON SUN-STAR, *S. papposa*, twelve or thirteen. The colors in this are variable but brilliant—red, purple, green, and white. It measures from nine to twelve inches across, and feeds ravenously on shell-fish. These are British species; it is said we have similar ones on our northeastern coasts.

ORDER 4. CRINOIDEA.

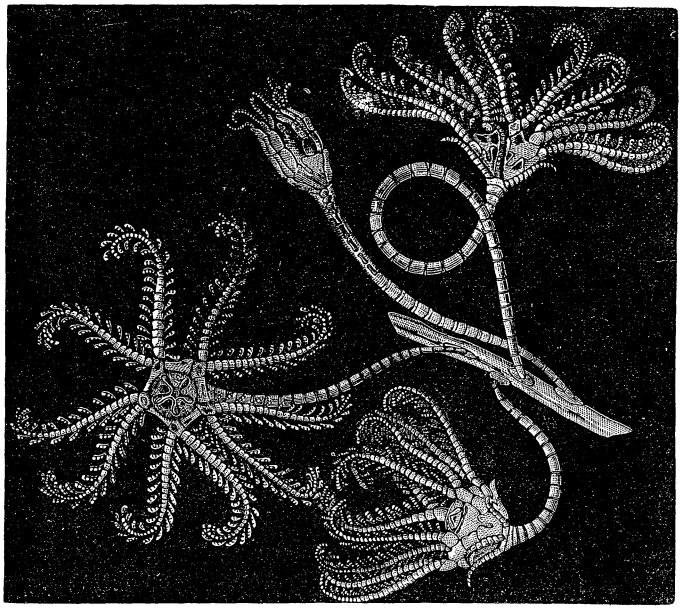
The *Crinoidea*, or *Sea-Lilies*—so called from the resemblance which many of them present to flowers—were exceedingly abundant in former ages of the world; and their remains often form the great bulk of large masses of rock; at the present day they are comparatively rare. They are divided into several families.

THE ENCRINIDÆ.

The family *Encrinidæ* includes an immense number of fossil forms; and one or two are still to be found in the West Indian seas. These animals were all supported upon a long stalk, at the extremity of which they floated in the waters of the ancient seas, spreading their arms in every direction in search of the small animals which constituted their food. Each of these arms, again, was feathered with a double series of similarly-jointed appendages; so that the number of calcareous pieces forming the skeleton of one of these animals was most enormous. It has been calculated that one species, the *Pentacrinus Briareus*, must have been composed of at least one hundred and fifty thousand joints; and, "as each joint," according to Dr. Carpenter, "was fur-

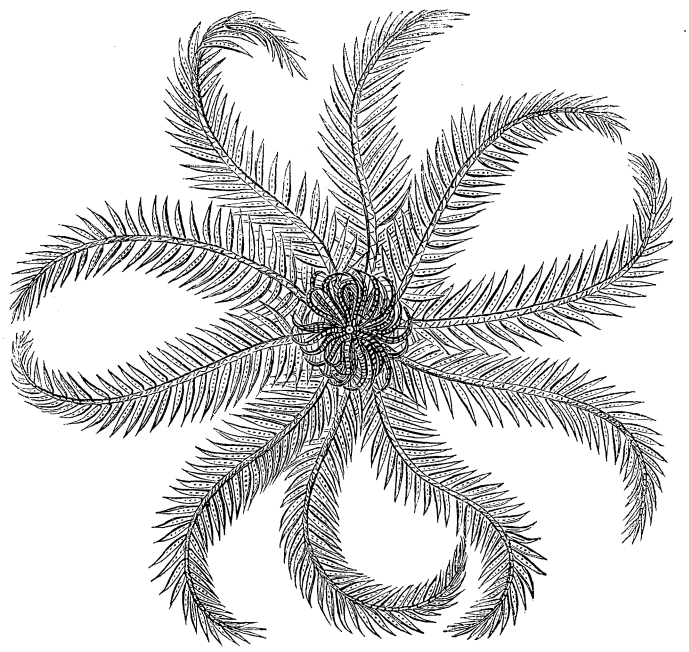
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nished with with at least two bundles of muscular fiber—one for its contraction, the other for its extension—we have three hundred thousand such in the body of a single *Pentacrinus*, an amount of muscular apparatus far exceeding any thing that has been found elsewhere in the Animal Creation."



ENCRINIDÆ.

Dr. Buckland describes these animals as destined to find their nourishment by spreading their nets and moving these bodies to a limited degree, while they were yet fixed to the bottom of the sea. After noting the fact that few of these species now exist in a living state, he states that the substance of vast beds of marble in Europe and America "is almost as entirely made up of the petrified bones of Encrinidæ as a corn-rick is composed of straws. Man applies it to construct his palace and adorn his sepulcher, but there are few who know and fewer still who appreciate the surprising fact that much of this marble is composed of the skeletons of millions of organized beings once endowed with life."



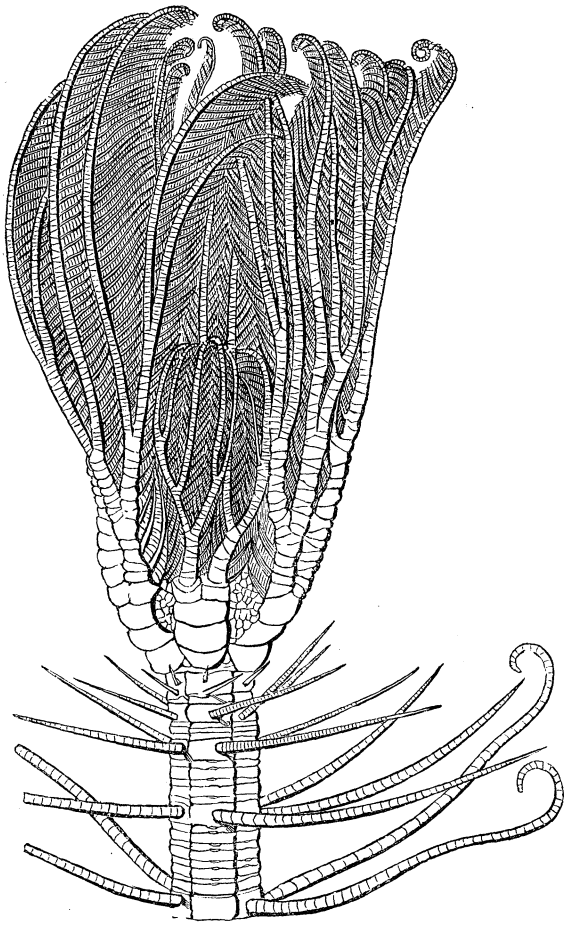
THE ROSY FEATHER-STAR—COMATULA ROSACEA.

More than thirty species of Crinoidea that have thus become extinct, have been identified. The MEDUSA'S HEAD PENTACRINUS, *P. Caput-Medusæ*, is one of the existing species, and a few specimens of it have been found near the islands of Barbadoes and Martinique. This may be considered as one of the greatest wonders of nature, it being a real animal, having blood, and feeding upon other marine animals, yet having the form of a plant, and living like a plant, fixed to a rock in the deep sea. It is supposed by naturalists that it stands erect, yet yields to the fury of storms which agitate the waves, by bending down and adhering for additional security, with its side arms, to such fixed objects as may be within reach; or sometimes it may fold its arms close to the column, so as to offer the least possible surface to the tumultuous element. (See engraving p. 630.)

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THE COMATULIDÆ.

This family, the species of which are called *Hair-Stars* or *Feather-Stars*, includes a considerable number of animals, which bear a great resemblance, both in form and structure, to the Encrinidæ. They are, however, only furnished with a stalk during their young state, and on arriving at maturity they quit their attachment, and crawl about freely at the bottom of the water, in the same manner as other star-fishes. The body is flattened and covered with separate calcareous plates; the lower, or ventral surface, bears the mouth and anus; and the ten slender rays are often branched to such an extent as to appear very numerous. These are furnished throughout their length with slender, jointed cirri, similar to those of the Encrinidæ, by the assistance of which and the short ambulacra, the Hair-Stars are enabled to grasp any object firmly, and creep about on submarine plants with great ease.



THE MEDUSA'S HEAD PENTACRINUS.

In their young state, the *Comatulæ* greatly resemble the animals of the preceding family, being supported on a long flexible stalk, formed of calcareous cylinders. So close is this resemblance, that when first discovered the young of the Comatula was described as a Pentacrinus. These animals are tolerably numerous in the seas of the present day, where they constitute, in fact, the principal representatives of their order. In the earliest ages of the world, their place was taken by the fixed Encrinidæ; and the free Comatulæ do not make their appearance in any formation earlier than the Jurassic strata.

Class II. SIPHONOPHORA.

The *Siphonophora* form a group of animals of which we have still much to learn before their true nature and relations can be ascertained. They are divided into two orders—the *Physograda* and *Chondrograda*.

ORDER 1. PHYSOGRADA.

The characteristic of the animals forming this order is, that they are furnished with a vesicular organ containing air, which serves as a float to buoy them up in the water. The best known of this species is the *Physalia Atlantica*, which has received from sailors the name of the *Portuguese Man-of-War*. It swims in great crowds at the surface of the water, and possesses a very strong urticating or stinging power.

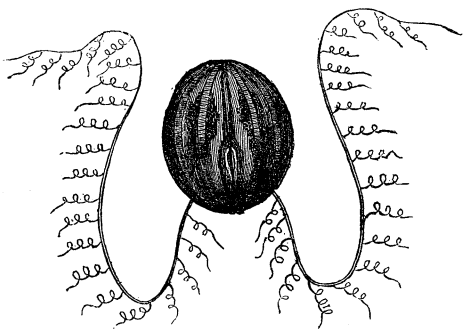
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ORDER 2. CHONDROGRADA.

These animals are called *Chondrograda* from the circumstance that the circular or oval disc, of which their body is composed, is supported upon a somewhat cartilaginous plate, which sometimes even contains a calcareous deposit; the lower surface of this disc is furnished with cirri, some of which are tubular. Many of these creatures are exceedingly beautiful, blue being their prevailing color. In the genus *Porpita*, one species of which is found in the Mediterranean, the disc is surrounded by a beautiful fringe of tentacles; but the most remarkable structure is presented by the *Velella*, in which an oblique upright crest is developed upon the upper surface of the disc, serving as a sort of sail to waft the little mariner from place to place. One species of this genus is found on the coasts of Ireland.

Class III. CTENOPHORA.

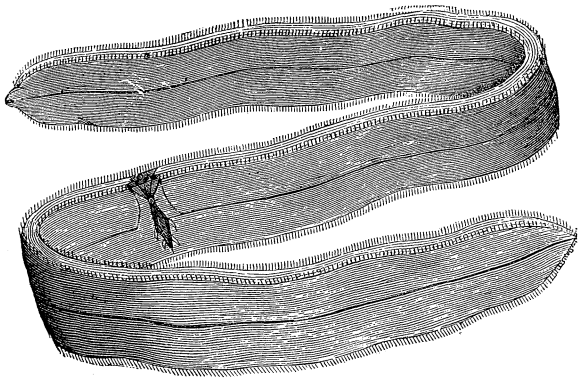
We now come to a class of animals, the real nature of which is still to be made out. They are gelatinous, transparent creatures, generally of an oval form, enabled to swim freely by the action of variously-arranged rows of cilia.



THE CYDIPPE, FORMERLY CALLED THE BEROE PILEUS.

The *Beroidæ*, which form the first family, may almost be said to possess no true stomach, the body being so formed as to inclose a great cavity, of which the hinder portion serves as a digestive organ. When the animals have much food in this cavity, they constrict the middle of the body so as to prevent any of it from escaping. The body is oval or roundish, with eight rows of cilia running from one end to the other. The mouth is large, and opens and shuts with facility; it is generally held open when the creature is in motion. The tentacles are wanting in this family. The species are gelatinous, and at night shine like lamps suspended in the water

The *Callianiridæ* are distinguished from the Beroidæ by the small size of the stomach and mouth, and by the possession of filamentous tentacles. The *Cydippe*, formerly called *Beroe Pileus*, is now referred to this family, it has a globular body, with two long ciliated appendages. But the most singular of these animals is the Venus' Girdle, *Cestum Veneris*, which inhabits the Mediterranean, and which at first sight would be taken for any thing rather than a near relation of the little globular *Cydippe*. In this curious creature the sides of the body are produced into a long ribbon, which sometimes attains the length of four or five feet; the mouth and digestive organs being, however, confined to their original position in the middle of the body. This animal is one of the most beautiful inhabitants of the ocean. When in motion, its waving cilia, which are placed along the margins of the body, glitter with all the tints of the rainbow; at night it appears like a long waving flame in the water.

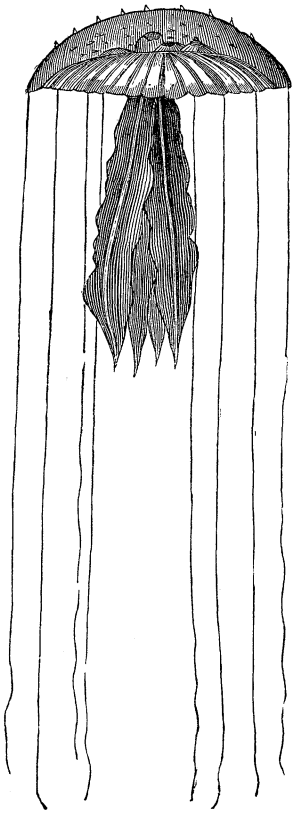


VENUS' GIRDLE.

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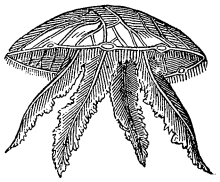
Class IV. DISCOPHORA.

This term is from the Greek *diskos*, a disc, and *phero*, to bear, and alludes to the general form of the animals belonging to this class. They bear the popular names of Jelly-Fishes and Sea-Blubbers, from their gelatinous nature, and Sea-Nettles, from the stinging sensation they have the power of producing when touched; the term *Acalephæ*, which has been generally applied to them, has this signification. They are exclusively natives of the ocean, which teems with them, from the intertropics to the polar circle. Among the strange and beautiful creatures which tenant the thronged and populous waters of the sea, they exhibit sometimes the most fantastic, sometimes the most elegant figures, adorned with colors of surpassing richness; nor is their variation in size less striking than that of their forms. Some are so minute as to require the aid of a microscope, in their examination; others form large masses, which, as they float on the waves, cannot but attract attention. Many shine with phosphorescent brilliance; as the vessel plows the briny water, or the oars of the boat throw up the spray, when darkness covers the face of the deep, they glitter like a shower of stars, and falling again, are lost in a sea of effulgence. Some appear in the depths like balls of glowing metal; some move with an undulating course, appearing as they pass like a ribbon of flame; others like diamonds gem the rocks or the fronds of sea-weed; some float in shoals, displaying the lovely tints of the rainbow; while others, like orbs of silver, glitter as they float on the rolling current. They appear to be of a homogeneous and gelatinous consistence, but in reality are composed of filmy tissues, disposed in a cellular manner, and inclosing an abundance of sea-water, which, when they are left dead on the beach, soon dries up, leaving only a little scum or gummy web behind.



THE PELAGIA LABICHE.

"In walking along the sea-beach," says Dallas, "as the tide is falling, the attention of the wanderer is often attracted by the number of singular gelatinous masses left on the sands. At first sight it would never be suspected that these are really living animals endowed with a structure of considerable complexity; but a very little examination will soon show the observer that this is the case. If one of these lumps of jelly be put into a clear pool or basin of sea-water, parts, before confounded in a shapeless mass, immediately unfold themselves; a circular, umbrella-like disc, surrounded by numerous short filamentous tentacles, appears to support the creature at the surface of the water; and from the center of this, depend four long arms with membraneous fringed margins. This is the *Medusa aurita*, one of the commonest species, and must have been often observed by those who frequent the sea-shore. In the water the creature swims along most gracefully by the contraction and dilatation of its transparent disc."

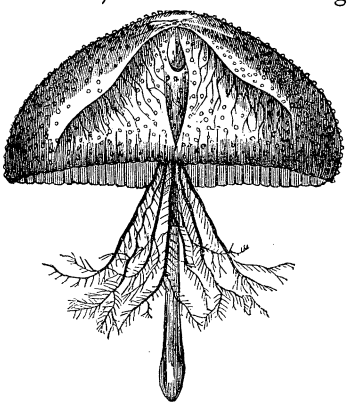


THE MEDUSA AURITA.

All the animals of this class present a structure very similar to this. They all possess a disc of greater or less convexity, which is employed, in the manner already described, for the purposes of locomotion; and in most of them the margin of this disc is furnished with tentacles or cirri. The disc, or *umbrella*, consists of two membranes, of which the lower is called the *sub-umbrella*. In the center of this the mouth is situated, sometimes at the extremity of a peduncle of variable length, which contains the stomach, and in some cases also the ovaries. The mouth is most frequently furnished with tentacles. Some genera, although provided with a large peduncle or with tentacles, are said to have

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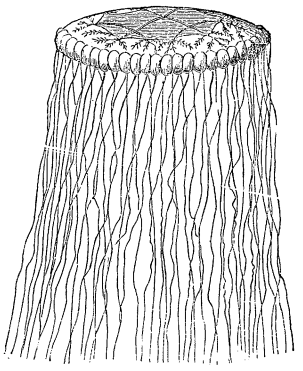
no mouth, the nourishment being absorbed through a number of small pores scattered upon these organs, and communicating by minute tubes with the stomach, which, as usual, is situated in the peduncle.



THE FAVONIA OCTONEMA.

It would be in vain to attempt to describe the various forms of these creatures. We give a few engravings, representing some of the most characteristic; as the *Favonia octonema*, with a nearly hemispherical body, showing a long proboscis, at the root of which are eight branchiferous appendages—inhabiting the South Seas: the *Pelagia Labiche*, with four foliaceous arms, and long filaments depending from the rim of the umbrella—also found in the South Seas; and the *Cuvieria carisochroma*, which is without a central peduncle, yet has numerous long appendages hanging from its border.

The stinging power, which is common to several groups of radiate animals, is possessed by many Medusæ in the greatest perfection. Of the *Cyanœa capillata*—a species common on the British coast—Professor Forbes speaks as follows: "This inhabitant of our seas is a most formidable creature and the terror of tender-skinned bathers. With its broad, tawny, festooned and scalloped disc, often a full foot, or even more across, it flaps its way through the yielding waters, and drags after it a long train of ribbon-like arms and seemingly interminable tails, marking its course when the body is far away from us. Once tangled in its trailing 'hair' the unfortunate who has recklessly ventured across the graceful monster's path too soon writhes in prickly torture. Every struggle but binds the poisonous threads more firmly round his body, and then there is no escape; for when the winder of the fatal net finds his course impeded by the terrified human wrestling in his coils, he, seeking no combat with the mightier biped, casts loose his envenomed arms and swims away. The amputated weapons, severed from their parent body, vent vengeance on the cause of their destruction, and sting as fiercely as if their original proprietor itself gave the word of attack." This is a large species; most of the smaller ones appear to possess no urticating power, at least none capable of making an impression upon the human skin.



THE CUVIERIA CARISOCHROMA.

The reproduction of the Medusæ has been a subject of the most elaborate investigation. These animals are all unisexual, and propagate by eggs, which the female produces in glandular organs, sometimes arranged in bands or patches on the surface of the sub-umbrella, and sometimes in cavities at the base of the peduncle. But these ova, when excluded, produce creatures very different from the parents, and it is not till the second generation that the original Medusa is reproduced. This has led to the following theory, put forth by Steenstrup: "The fundamental idea expressed by the words '*Alternation of Generations*,' is the remarkable phenomenon of an animal producing an offspring which at no time resembles its parent, but which, on the other hand, itself brings forth a progeny which returns in its form and nature to the parent animal, so that the maternal animal does not meet with its resemblance in its own brood, but in its descendants of the second, third, or fourth degree of generation. And this always takes place in the different animals which exhibit the phenomena in a *determinate* generation, or with the intervention of a *determinate* number of generations. This remarkable *precedence* of one or more generations, whose function it is, as it were, to prepare the way for the later succeeding generation of animals destined to attain a higher degree of perfection, and which are developed into the form of the mother, and propagate the species by means of ova, can, I believe, be demonstrated in not a few instances in the animal kingdom."

Forbes admits the general correctness of this theory, but considers that in regard to the Medusa it has many exceptions, and in illustration of this view states that at least four British spe-

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cies of Medusæ, two of *Lizzia* and two of *Sarsia*, have the power of producing young animals by direct gemmation, and their development from a zoophytic form has not yet been observed. In *Lizzia* and *Sarsia gemmifera* the buds are produced from the stomachal peduncles; but in the other species of *Sarsia*, *S. prolifera*, they originate from the bulbs at the base of the tentacles, where they may be seen attached in all stages of development. "What strange and wondrous changes!" says he, after detailing his observations upon the last-mentioned minute Medusa. "Fancy an elephant with a number of little elephants sprouting from his shoulders and thighs, bunches of tusked monsters hanging, epaulette-fashion, from his flanks, in every stage of advancement! Here a young pachyderm, almost amorphous; there one more advanced, but all ears and eyes; on the right shoulder a youthful Chuny, with head, trunk, toes, no legs, and a shapeless body; on the left, an infant better grown, and struggling to get away, but his tail not sufficiently organized as yet to permit of liberty and free action! The comparison seems grotesque and absurd; but it really expresses what we have been describing as actually occurring among our naked-eyed Medusæ. It is true that the latter are minute; but wonders are not less wonderful for being packed into small compass."

Wonderfully beautiful are many of these creatures in form and color, but, as we have before stated, the amount of solid matter contained in their tissues is incredibly small. The greater part of their substance appears to consist of a fluid, differing little, if at all, from the sea-water in which the animal swims, and when this is drained away, so extreme is the tenuity of the membranes which contained it, that the dried residue of a jelly-fish weighing two pounds, which was examined by Professor Owen, weighed only thirty grains. Yet these creatures are capable of executing movements with considerable vivacity—their disc contracts and dilates alternately by the action of a band of what must be regarded as a muscular tissue—their tentacles are capable of seizing upon and destroying, by a subtle venom, animals of far more complicated structure than themselves, and their delicate stomachs have the power of speedily digesting the victim. In fact, in spite of the extreme delicacy of their texture, the Medusæ are among the most voracious inhabitants of the ocean. Small fishes and crustacea, and all the infinite multitude of minute marine creatures, are seized and paralyzed by their deadly arms; and as the mouth and stomach are capable of almost indefinite dilation, the size of their prey often appears exceedingly disproportionate. Of the voracity of one of the most delicate and beautiful species of the small Medusæ inhabiting the British shores, the *Sarsia tubulosa*, a little creature of the size and shape of a very small child's thimble, Professor Forbes speaks as follows: "Being kept in a jar of salt water with small crustacea, they devoured these animals, so much more highly organized than themselves, voraciously, apparently enjoying the destruction of the unfortunate members of the upper classes with a truly democratic relish. One of them even attacked and commenced the swallowing of a *Lizzia octopunctata*, quite as good a Medusa as itself. An animal which can pout out its mouth twice the length of its body, and stretch its stomach to corresponding dimensions, must, indeed, be 'a triton among the minnows,' and a very terrific one too."

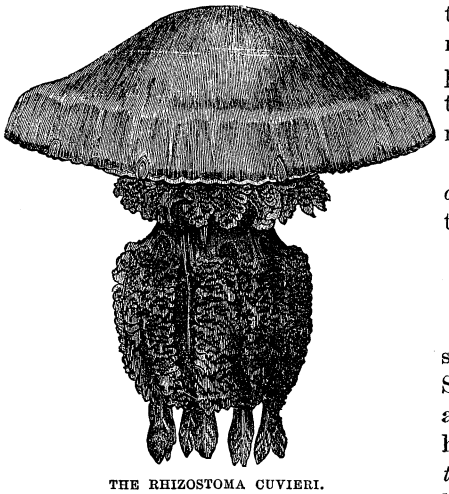
Professor Forbes separates the Medusæ into two great divisions, which we shall adopt as orders. In the first of these the ocelli, or eye-like spots, surrounding the margin of the disc, are protected by more or less complicated membraneous hoods or *lobed coverings*, while in the second these organs are *naked*. Hence the former are called *Steganophthalmata*, *Covered-eyed*, the latter *Gymnophthalmata*, or *Naked-eyed*. In the latter the ocelli, when present, are always placed on the bulbs at the base of the tentacles, and frequently also on the interstices between them. In the first order, on the contrary, they are always placed between the marginal tentacles.

ORDER 1. STEGANOPHTHALMATA.

The Medusæ of this order often attain a gigantic stature: the *Rhizostoma Cuvieri*, a British species, measures two feet, or even more, in diameter, while some of the inhabitants of tropical seas are said to attain a still larger size. In calm weather they often swim close to the surface of the sea, in such multitudes as to impede the motion of a boat through the water. Such a

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fleet as this, seen with the sun shining strongly upon them, is a magnificent spectacle, from the beautiful iridescence with which the sunlight is reflected to the eye of the beholder. With the approach of night this scene of beauty only gives place to another; for these Medusæ are exceedingly luminous in the dark.



THE RHIZOSTOMA CUVIERI.

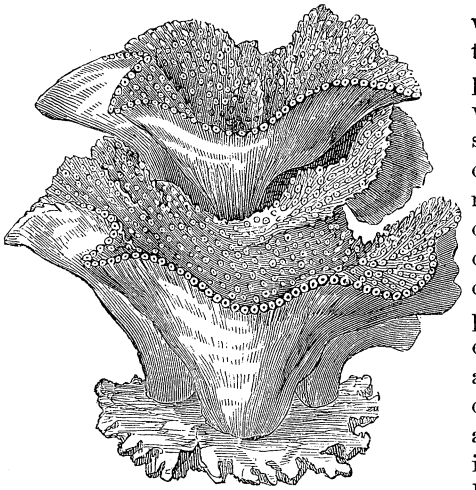
The *Medusa aurita*, *Pelagia Labiche*, and *Cyanœa capillata*, which we have already noticed, belong to this order, as well as a multitude of others.

ORDER 2. GYMNOPHTHALMATA.

This order includes a great number of genera, the species of which vary exceedingly in form and size. Several species are found in the European seas, and among them the *Sarsiœ* and *Lizziœ*, some of which we have mentioned; also those of the genus *Thaumantias*, which are most important agents in producing the luminosity which is often witnessed in those parts of the ocean. The *Oceanidœ* are among the most delicate and beautiful of the order, consisting of a conical or globular glassy body, within which a variously colored peduncle may be seen. In the genus *Turris* the tentacles are exceedingly numerous, while in *Saphenia* they are reduced to two. In the *Willsidœ*, the radiating vessels, six in number, are curiously forked, and there are six ovaries placed round the base of the stomach. The *Æquoridœ* include some of the largest of the naked-eyed Medusæ.

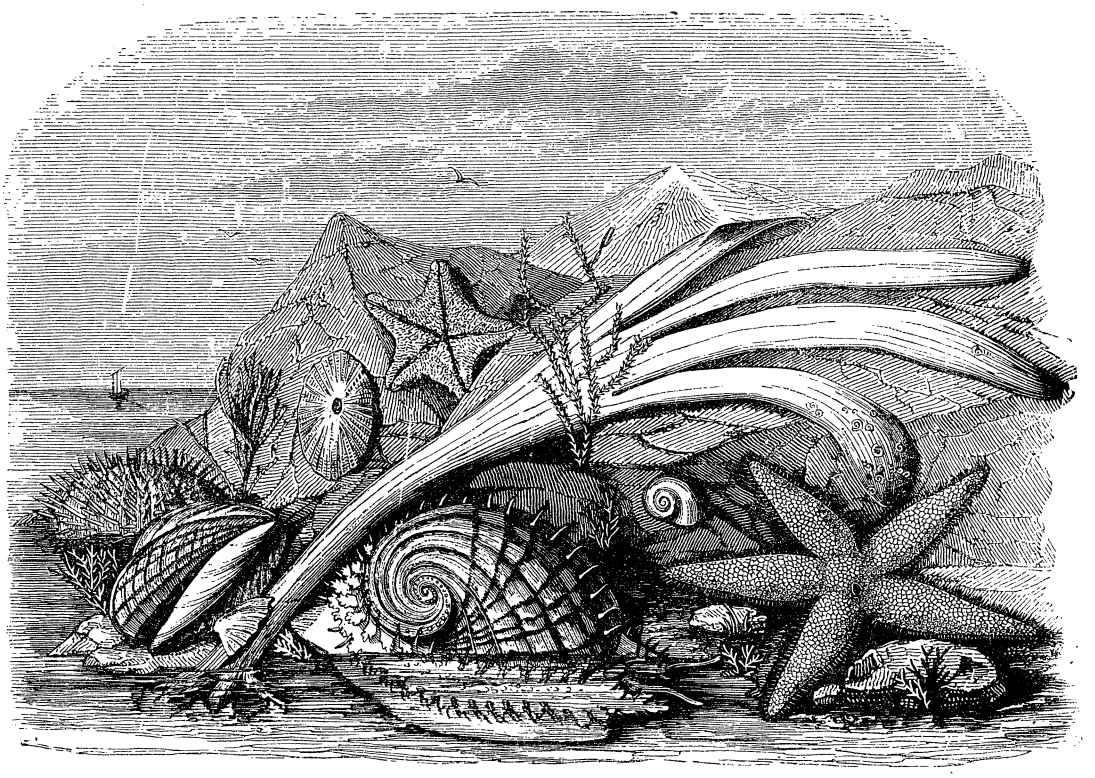
Class V. POLYPI.

This class, deriving its name from the Greek, *polus*, many, and *pous*, a foot, includes a great number of animals, bearing the various names of *Sea-Anemones*, *Corals*, *Madrepores*, *Zoophytes*, *Corallines*, &c. Most of them are of very simple construction. They are all aquatic in their mode of life, and by far the greater number inhabit the sea, a very few only being found in fresh water. Most of them live in societies of greater or less extent, supported on a common stock, or *polypidom*, a word which means the *House of the Polypi*, this being sometimes horny, sometimes calcareous. The little creatures are either imbedded in cavities, formed immediately in the substance of this support, or in a sort of flesh which sometimes incrusts it; or they are inclosed, as in the horny polypidoms, in minute cups or tubes, from which the body can be protruded at pleasure, and again retracted at the approach of danger, or during repose. These social polypi are always of small size, although the structures produced by the united labors of successive multitudes, are often sufficient to produce important changes even in the face of nature. Many of the solitary species, however, attain a considerable magnitude. The bodies of these animals are generally cylindrical in form, with a fringe of tentacles, or arms, frequently consisting of a considerable number, surrounding the anterior extremity, in the center of which the mouth is situated. The mouth is



POLYPIDOM OF TREE-CORAL.

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VARIOUS RADIATE ANIMALS UPON THE SEA SHORE.

the only aperture of the digestive cavity, and is quite destitute or any masticating apparatus. The skin in the compound polypi, which are able to retract themselves into firm cells or tubes, is exceedingly soft and tender; but in the solitary species it frequently acquires a leathery consistence, forming a closed sac, within which the more delicate tentacles can be retracted at pleasure. In many cases the skin contains urticating organs, consisting of minute transparent vesicles, from which long spiral threads and a caustic fluid are emitted, which cause a stinging sensation on coming in contact with the human skin. Reproduction takes place in these animals both by means of ova and by germination or budding. The sexes are always united in the same individual. This class is divided into three orders—*Helianthoida*, *Asteroida*, and *Hydroida*.

Before we proceed, however, to notice these separate divisions, we must more fully apprise the reader of the peculiar nature of some of the animals belonging to this order. It is to be borne in mind, that—as we have stated—some polypes are simple and others are congregated—these latter being united into one living whole, while, at the same time, each acts for itself; one contracting, another expanding at the same instant. In one sense we may consider each polype as a distinct being; in another sense, as forming a part of a compound unity through which vitality is equally diffused. In these aggregated forms the polypes all labor to one end; they constitute a community, every individual of which contributes to the nutrition of the general body. But as there are no nerves, they can neither participate in each other's movements or each other's feelings. If one polype is destroyed, the rest are unaffected. We may commence our observations by remarking, that all ideas of life derived from a consideration of the higher animals of creation must here be banished. Deadness to pain, yet feeling for light, contractility, expansibility, and motion without muscles; digestion and nutrition without lacteals, absorbents, or blood-vessels; reproduction by simple division or bud-like sprouts; the vital unity of myriads, and yet their personal distinctness—these are the curious, strange, anomalous characteristics which belong to the animals we are now about to contemplate.

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ORDER 1. **HELIANTHOIDA.**

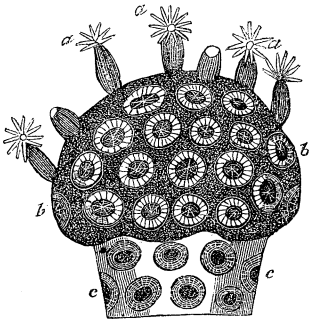
Of the Helianthoid polypes, deriving their name from *helios*, *anthos*, and *eidos*, sun, flower, and resemblance, the common *Sea-Anemones*, found on nearly all coasts, may serve as an example. They all have a stomach, consisting of a sac quite distinct from the walls of the body; the space between the stomach and the outer integuments is divided into cells by membraneous and muscular partitions, upon which the ova are produced. The mouth is surrounded by a variable number of tubular tentacles, which are generally very numerous, and arranged in multiples either of five or six. We shall treat them under the following heads: *Madreporidæ*, *Cyathophyllidæ*, *Astræidæ*, *Fungidæ*, *Zoanthidæ*, *Actiniadæ*, and *Lucernaridæ*.

THE MADREPORIDÆ.

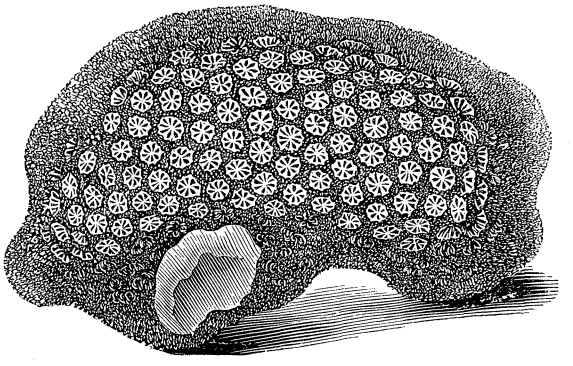
These animals are generally called *Tree-Corals*, on account of the forms of the polypidoms which they build and in which they live. They are very small, and possess twelve short tentacles placed in a circle round the mouth; they occupy the cells in the polypidom, which is of a porous nature, the openings of the cells being placed at the summits of tubercular prominences of greater or less elevation. The animals are of various species and their polypidoms are of various forms, though generally more or less branched and tree or plant shaped.

THE CYATHOPHYLLIDÆ.

These, which are called *Cup-Corals*, form polypidoms of a more or less cup-like shape, with the cells occupied by the polypes, at the upper extremity. The species are large, and furnished with many tentacles, and the rays of the cells are also numerous. Species of this and the preceding group are found in deep water off the British coasts.



ASTRÆA VIRIDIS.*



ASTRÆA ROTULOSA.

THE ASTRÆIDÆ.

It is to this family more especially that the formation of the coral reefs is to be attributed.† In this the corals usually form thick stony masses; the stony rays of the cells are exceedingly numerous, and the cells themselves penetrate deeply into the mass of coral, although they are generally par-

* *a a*, expanded polypes; *b b*, polypes withdrawn into their cells; *c c*, coral uncovered by flesh, showing the cells.

† Humble as these creatures are, their operations occupy an important place in the history of the globe. Islands —some of them of considerable size, and affording a habitation to an entire race of human beings—owe their elevation from the bottom of the ocean, and the solidity which enables them to resist the continual action of the tremendous breakers of the tropical seas, to the labors of these apparently contemptible agents; and in the geological periods of the world's history, they appear to have played even a still more important part.

Three kinds of coral-reef are distinguished. Nearly all the shores of the seas inhabited by the reef-building corals, which occupy a broad zone extending between twenty and thirty degrees of latitude on each side of the equator, are more or less fringed with their living walls; these are called *skirting reefs*. Other reefs are sometimes met with at a much greater distance from the shore, although still, to a certain extent, running parallel to its outlines. To these the name of *barrier-reefs* has been given; the most remarkable of them is the great reef which runs along the coast of Australia. The third form of reef is presented by a great number of the Polynesian islands. Many of these are of a

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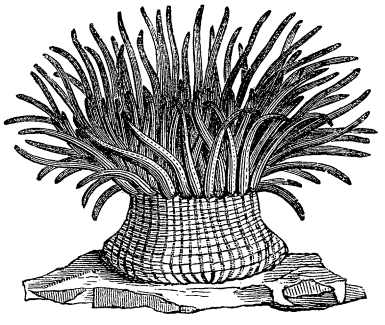
tially divided by imperfect transverse partitions. Most of the zoophytes of this family appear to increase by a sort of spontaneous division, instead of gemmation. By this means the body of the polype, and the cavity it occupies, are in many cases not distinctly circumscribed; and the latter form curious, elongated, winding depressions in the surface of the coral.

THE FUNGIDÆ.

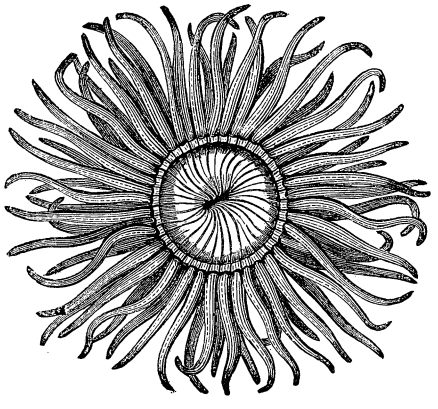
In the *Fungidæ* the polypes are single and often attain a considerable size. The polypidoms form oblong or roundish masses, furnished with an extraordinary number of rays, the outermost of which project from the circumference without being confined by any outer walls. The polype occupies the whole of this radiated edifice; it is furnished with a tubular mouth in the centre, and with numerous short, round tentacles, which are scattered over the upper surface.

THE ZOANTHIDÆ.

The family *Zoanthidæ* consists of somewhat clavate polypes, presenting a considerable resemblance in their general structure to the *Actiniæ*. They differ from these, however, in being social in their mode of life, a number of polypes being united by a common creeping stem, which attaches them to some submarine object, and from which new polypes are produced at intervals as it runs along. The mouth is surrounded by a single row of tentacles.



ACTINIA OR SEA-ANEMONE.



THE MOUTH OF THE SEA-ANEMONE.

THE ACTINIADÆ.

We now come to the *Sea-Anemones*, or *Sea-Carnations*, of which there are several species on our own coasts; but it is in the seas of tropical latitudes that they are to be found in the greatest profusion, and presenting the most beautiful appearance. Their tentacles, which are disposed in regular

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crescent-like form, even sometimes completely circular, inclosing, as within a wall, a basin of still water, called a *lagoon*, in which the more delicate marine animals find a welcome refuge from the tumultuous waves which rage without. These islands, which are called *atolls* or *lagoon-reefs*, are generally highest on the windward, or eastern side, against which the waves are continually dashing with great violence; the polypes, from some cause still unexplained, building with greater rapidity on that portion of the reef which is constantly exposed to the action of the breakers. On the opposite or leeward side, the reef is seldom completed; so that at this part the lagoon usually communicates with the open sea by an opening of variable width. As exposure to the air appears quickly to be fatal to these polypes, they never raise their habitations quite to the surface of the water, usually stopping at four or five feet below low-water mark. It is evident, therefore, that the living polypes can have nothing to do with the final elevation of the coral islands above the level of the sea; and we find that this is due to the action of the very waves which appear to threaten the island with destruction. The violence of the storm breaks off large fragments from the lower parts of the reef, and washes them up to its surface, where they rest, and gradually become agglutinated together by a constant deposit of calcareous sand, produced by the disintegration of the coral. In course of time these deposits rise above the surface.

Few things in nature can give us a more vivid conception of the power of that Omnipotent Creator at whose command these apparently insignificant creatures rear their stupendous edifices from the deep. Some idea of the number of architects required to produce these vast results may be obtained from the following remarks by Mr. Dana: "Calculating the number of polypes that are united in a single Astræa dome twelve feet in diameter, each covering a square half inch, we find it exceeding one hundred thousand; and in Porites of the same dimensions, in which the

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circles, and tinged with a variety of bright lively colors, very nearly represent the beautiful petals of some of the most elegantly fringed and radiated flowers, such as the carnation, marygold, and anemone. They are of various sizes, from that of the smallest thimble to the largest apple; and have considerable power of locomotion, being able not only to move along upon the base, but also in a reversed position upon their tentacles. Forbes describes one that walked up the sides of a glass by alternately adhering by its disc and base, in the manner of a leech. They are voracious in their habits, feeding upon almost any kind of small animal that comes within their reach; shrimps and small crabs, whelks, and even small fishes are the common victims of their rapacity. They have wonderful tenacity of life; Dr. Johnston says: "They may be kept without food for upwards of a year; they may be immersed in water hot enough to blister the skin, or frozen in a mass of ice and again thawed; and they may be placed in the exhausted receiver of an air-pump, without being deprived of life or disabled from resuming their usual functions when placed in a favorable situation." The most serious mutilations appear to be equally subjects of perfect indifference to them; their tentacles may break off and new ones will soon spring up in their place; the whole upper part of the body may be cut away, and after a time the base will produce a new mouth, oral disc, and tentacles, and proceed with its vital functions as if nothing had happened to disturb the even tenor of its existence. Nay, it is said that if the whole body be torn away, leaving only a portion of the base, this fragment will gradually produce a new creature. Still less does the upper portion, when amputated in this manner, lose any fraction of its vitality. On the contrary, as soon as it has recovered from the shock naturally consequent upon such unceremonious treatment, it resumes its former activity, stretching out its tentacles and capturing its prey, apparently quite unconscious that it has no stomach to put it into—for at first all the food taken in at the mouth passes out at the opposite end, "just as a man's head, being cut off, would let out at the neck the bit taken in at the mouth." Some species of Actiniæ are eaten, and are said to be highly relishing food.

THE LUCERNARIDÆ.

These animals, of which there are many species, are of a gelatinous consistence, and generally adhere by a narrow stalk to sea-weeds or other floating submarine bodies. The anterior widened extremity forms an oral disc, which is either quadrangular or octangular in its form, the angles being more or less produced into pedicles, which bear numerous short, knobbed tentacles. When the disc is quadrangular, the pedicles are forked at some little distance from their base, so that there are always eight tufts of tentacles. They feed upon any minute animals that may stray into the neighborhood of their tentacles, which, when seeking for food, are stretched out to their full extent; but as soon as any unfortunate creature comes in contact with them, they seize it, and fold it into the mouth immediately.

ORDER 2. **ASTEROIDA.**

The asteroid polypes are all compound animals, inhabiting a polypidom, which consists of a fleshy external layer, supported upon a calcareous axis. The polypes which are imbedded in this fleshy mass are furnished with eight flat tentacles, placed in a single circle round the mouth, and not unfrequently toothed or fringed on their margins. They are divided into several families.

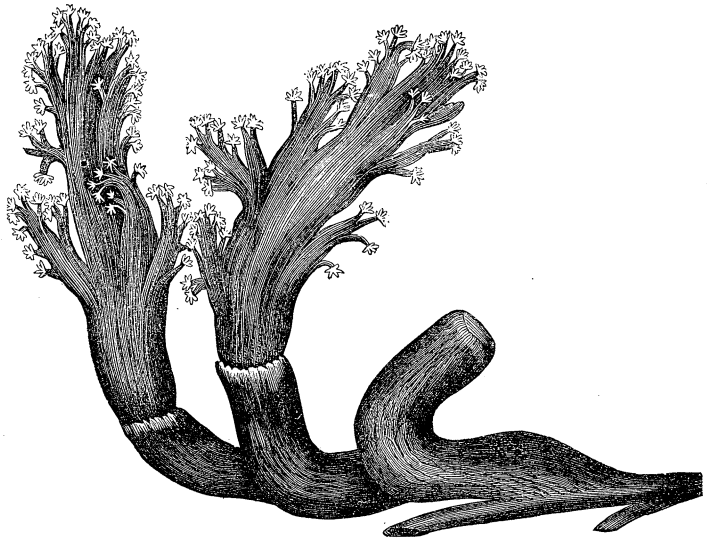
THE TUBIPORIDÆ.

Of the typical genus *Tubipora* there is only a single known species, the Red Organ-Coral, *T. musica*, inhabiting the Indian Ocean. The polypidom of this has a deep crimson color, contrasting strongly with the bright green of the living polypes.

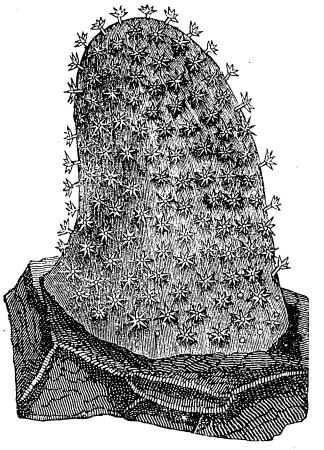
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animals are under a line in breadth, the number exceeds five and a half millions. There are, consequently, five and a half millions of mouths and stomachs to a single zoophyte, contributing together to the growth of the mass." From age to age, from the earliest periods to which the study of fossils can carry the history of our planet to the present time, countless millions of these humble zoophytes have been ceaselessly toiling, separating calcareous matter from the waters of the ocean, and fixing it in a permanent and solid form; and immense beds of calcareous rock, in various parts of the world, bear witness to their unceasing activity, perhaps even more than the coral islands of the recent seas.

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ALCYONIUM ELEGANS.

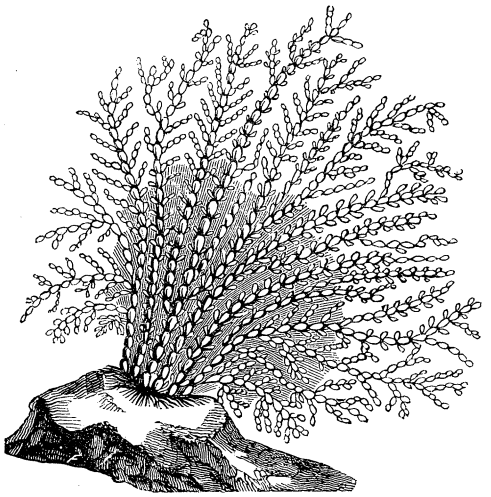


CYDONIUM MULLERI.

THE ALCYONIDÆ.

This family includes severa. genera, as *Alcyonium*, *Lobularia*, *Cydonium*, &c. In the genus Alcyonium, the polypidom is of a spongy nature, and contains a multitude of minute calcareous concretions, which serve to give firmness to the fabric. When the polypes are contracted, the surface of the polypidom, which is covered with a coriaceous skin, is seen to bear numerous scattered stellate marks, which, on examination, are found to consist of eight rays corresponding with the tentacula of the polypes which are to be protruded from these spots. The cells occupied by the polypes are placed at the terminations of canals which run through the polypidom, and which, by their union with each other, serve to maintain a communication between the individual polypes constituting the mass. These groups are always attached to submarine bodies. The *Alcyonium digitatum*, is a common European species; among the English it has the various names of *Cow's Paps*, *Dead Man's Toes*, *Dead Man's Fingers*, &c. The French call it *Main de Mer*, and the Germans *Fingerkork*. All these names are descriptive of its appearance.

One of the most remarkable species belonging to this family is the *A. poculum*, or *Neptune's Cup*, which is found upon the coral reefs in the Eastern Archipelago. The polypidom of this zoophyte, which bears some resemblance to a wine-glass in form, is sometimes as much as three feet in height, and eighteen inches in diameter at the mouth. In the *A. elegans*, the polypary consists of two parts, the lower one being hard and of a solid texture, and the upper one soft and flexible.



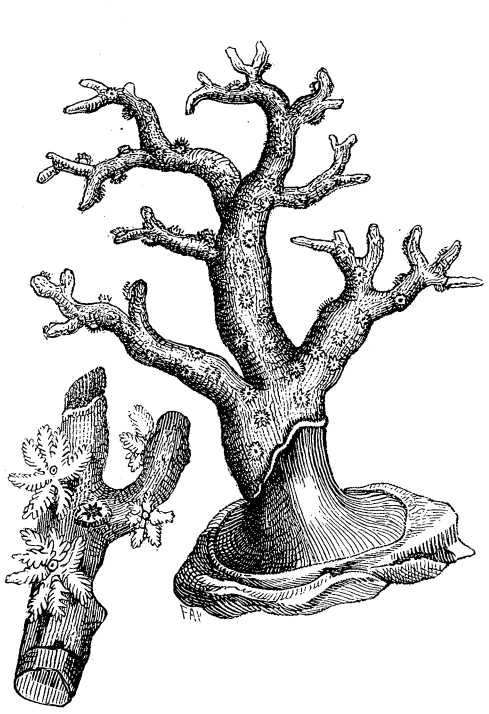
GORGONIA OR SEA-FAN.

THE GORGONIDÆ.

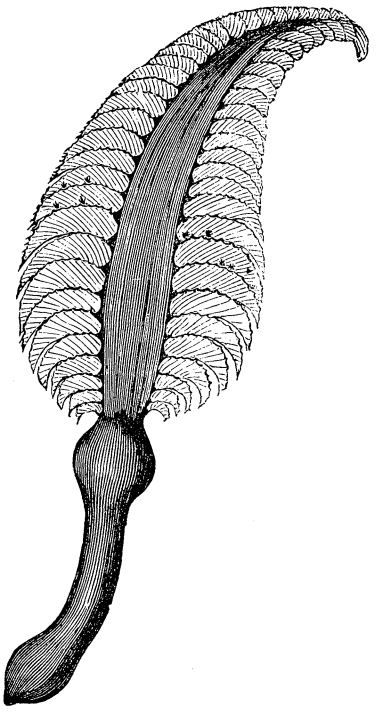
In this family the substance of the polypidom is collected into a solid central axis, covered by the fleshy mass in which the polypes are imbedded. The axis is sometimes calcareous, sometimes horny; in certain cases it is formed of a series of joints united by horny rings. Many species grow in a more or less arborescent form, of which the *Sea-Fans* are an example.

This family also includes the *Corallium rubrum*, the animal which produces the *Common Red*

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RED CORAL.



THE SEA-PEN.

Coral, a substance of great beauty, and of considerable value. It appears to be confined to the Mediterranean Sea, where it grows, especially on the southern coast, attached to rocks at considerable depths in the sea. It is fished up from the deep by means of nets and other instruments. The manufacture of ornaments of this coral at Naples is of great extent.

THE PENNATULIDÆ.

The zoophytes of the preceding groups all grow attached by the base to rocks or other submarine bodies; in the present family, on the contrary, the polypidom is completely unattached, and is only retained in its proper position by the insertion of the lower portion into the sand or mud of the bottom of the sea. The main stem of the polypidom of these animals is fleshy, but is furnished with an internal bony axis, which, however, does not reach to either extremity of the stalk. The polypes are not situated upon this portion, but upon a series of lamellæ, which stand out upon each side of the stalk, giving the whole polypidom, in some cases, the appearance of a large quill-feather. Of this the Sea-Pen, *Pennatula grisea*, is a familiar example. There are, however, many other forms.

ORDER 3. **HYDROIDA.**

This order contains some of the most wonderful of known animal existences. The body generally consists of a homogeneous aggregation of vesicular granules, held together by a glairy, intercellular substance, and capable of great extension and contraction, so that the creature may at pleasure assume a great variety of forms. The larger number of these animals live in societies, with branched horny polypidoms.

THE HYDRAIDÆ.

This family contains only a single genus, *Hydra*, some species of which may be met with in almost every piece of stagnant water. They are generally attached to some aquatic plant, the animal consisting of a long gelatinous cylinder, furnished with tentacles, with which it stretches about in the water for its minute prey. When contracted it becomes a mere lump of jelly. The

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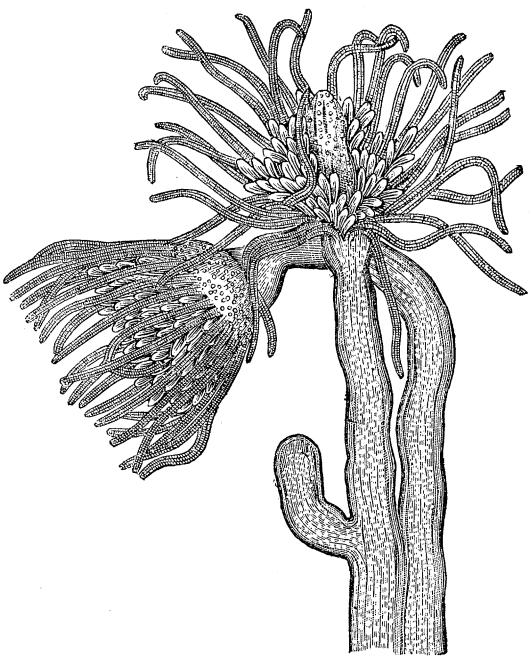
general mode of reproduction is by a process of budding or gemmation, by which a portion of the substance of the creature is pushed out and becomes a living Hydra. This takes place in summer; during the winter they produce oviform granules, which remain like seeds in the water, until the return of spring causes them to develop a new race of polypes.

The most wonderful part of the history of these creatures is still to be told. It appears to be well ascertained that they may be propagated by being cut in pieces, each piece becoming a complete living animal. Trembley says: "I have opened a polype on my hand, extended it, and cut the simple skin of which it is formed in every direction; I have reduced it to little pieces, and, in a manner, minced it. These little pieces of skin, both those which did and those which did not possess arms, became perfect polypes!"

The Hydræ are exceedingly voracious, and feed only on living animals. The larvæ of insects, worms, and the minute crustaceous animals which swarm in all waters, constitute their food. Sometimes two polypes will seize upon the same worm, when a dispute of course ensues, which occasionally ends in a very singular manner. If the weaker of the two does not feel inclined to let slip a booty for which he has perhaps been waiting with extended tentacles for several days, it sometimes happens that each polype swallows the end which has fallen to his share, until at length the worm being all gone, the mouths of the pair come into actual contact. They now find themselves in a position of considerable difficulty, which is sometimes terminated by the breaking of the worm; but if this does not take place, the larger or stronger of the two seizes upon his antagonist, and swallows him, worm and all. After a time the swallowed polype emerges from his living tomb; the worm, however, is gone! One of the most singular circumstances connected with the digestion of the Hydra—a digestion which is capable of dissolving creatures of far higher organization than itself—is, that the creature may actually be turned inside out without any derangement of its functions; the old inner surface now acts the part of a skin, while that which was the outer skin adapts itself without difficulty to the performance of the work of digestion!

THE SERTULARIDÆ.

These polypes all live in societies, each polype being inclosed in a sort of horny cup, supported on a branched polypidom of the same consistence. These polypidoms are among the most elegant productions of the sea, and their structure and formation are extremely curious. Their delicate arborescent forms are constantly to be seen attached to the sea-weeds left upon the beach by the retiring waves. Among the species are the beautiful Herring-Bone, *Halecium halecinum;* the Sea-Fir, *Sertularia abietina;* the Sea-Hair, *S. operculata;* the Fern Coralline, *S. filicula;* the Bottle-brush Coralline, *Thuiaria thuia;* the Feather Coralline, *Plumularia pennatula;* the Sea-Bristle, *P. setacea*, and many others—these being common on the Atlantic shores.



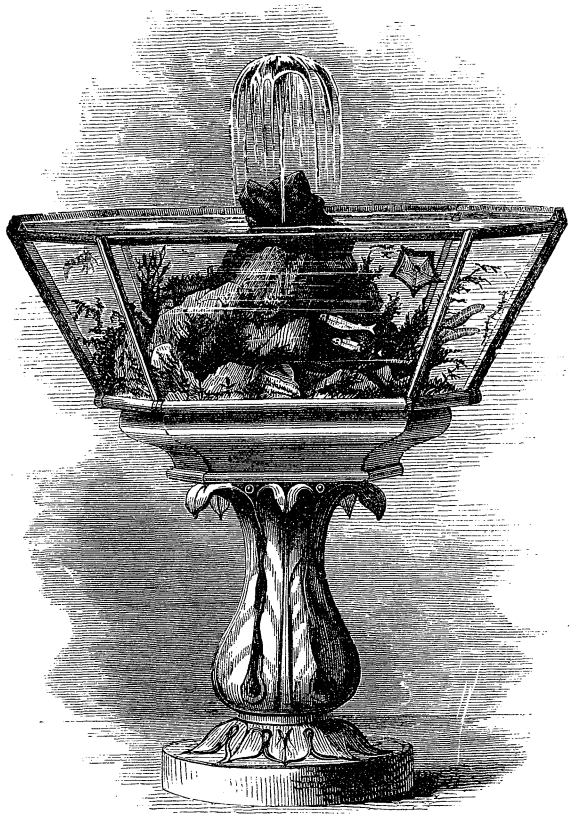
TUBULARIA CORONATA.

THE TUBULARIDÆ.

This family of hydroid polypes are for the most part social animals, frequently possessing a polypidom, which, however, when present, is of much less firm consistence than the horny framework of the Sertularidæ. The polypes are never entirely retractile within their tubes; the upper extremity is enlarged into a clavate head, surrounded by a variable num-

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ber of tentacles. Some of the species attain a considerable size. The *Corymorpha nutans* attains a length of four inches and a half. When placed in the water it has the appearance of a beautiful flower, its general color being pink.



THE FOUNTAIN AQUARIUM.

Aquaria.—We can hardly dismiss this Division of the Animal Kingdom without noticing a recent device, designed to bring into the house and home some of the most interesting species of animals which inhabit the waters, so that we may see them and study their habits, and thus unveil the mysteries of the deep; nay, make them the instruments of our daily and familiar amusements. This is the *Aquarium*, consisting of a glass tank or fountain, usually of an oblong shape, with straight sides, and of larger or smaller size, but yet of sufficient dimensions to admit of a floor of sand and stones, with a few water-plants, so that fishes of various kinds may freely move in the water above and around these objects. It is, in fact, a miniature of the water-home of the fishes; it is imitated from nature, though of such form as to be an ornament even to the parlor. Every one has seen the glass globe and the gold-fish uneasily and restlessly turning and winding within; this is a kind of aquarium, but its tenants are in an artificial and unhappy condition; the water becomes impure and needs frequent changing; the sides of the globe by their flexure, constantly enlarge and contract and distort the images of the moving objects of our attention. The true aquarium places, not solitary fishes in a barren and helpless isolation, but various kinds of sea animals in a natural companionship, and among objects with which nature associates them.

For this invention we are mainly indebted to Mr. Robert Warrington of England, who began his experiments there about the year 1850. Mr. Gosse, the English naturalist, took up the subject, and has largely contributed to the acquisition and diffusion of the practical knowledge requisite to the successful management of aquaria. In 1853, an aquarium on a large scale

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was opened in the Zoological Gardens, Regent's Park, London. The result was that the public mind became deeply interested in this subject, and speedily the parlors and libraries of the wealthy inhabitants of London became ornamented with aquaria. These are now, in fact, one of the cherished luxuries of rich and refined homes throughout England. In this country the subject has received less attention, though it is not wholly neglected. Several works on the aquarium have been published here; many private individuals, and several public institutions have adopted them.*

Aquaria are of two kinds, *marine* and *fresh-water*. For the former, our shores afford abundant supplies: among swimming fishes are the sticklebacks, minnows, killifish, blennies, gobies, bergalls, sand-smelts, sea scorpions, pipe-fish, suckers, the hippocampus, &c.: among crustacea, are crabs of many kinds—and very amusing little people they are—with lobsters, craw-fish, shrimps, &c.; among mollusca, we have several species of whelk, which are found useful as window washers, that is, in keeping the glass sides of the tank clear and bright; of zoophytes, we have also several kinds; we have a very common species of asteria—the five-fingered jack, known on all our coasts, though in the aquarium he is rather apt to snap off his fingers; we have not the splendid variety of sea-anemones found in European waters, but we have two or three interesting species; of the gorgeous serpula, we have several kinds. These, with other sea animals, afford abundant supplies for the marine aquarium.

For fresh-water aquaria we have also a great variety of curious and interesting species. For details in respect to the management of these, we must refer to the manuals, which afford all needful information. We may remark generally, that the care and labor required by an aquarium is far less than might be expected, as it has been found that certain plants, placed in the water, give it the necessary aeration, so that it will remain pure for a whole year, and therefore requires no change for that long period. An artificial method of aeration is sometimes adopted, which is also effective. As an enlightened amusement, as a beautiful lesson in the ways and works of nature, we earnestly recommend the aquarium to all our readers, especially to families where there are children.†

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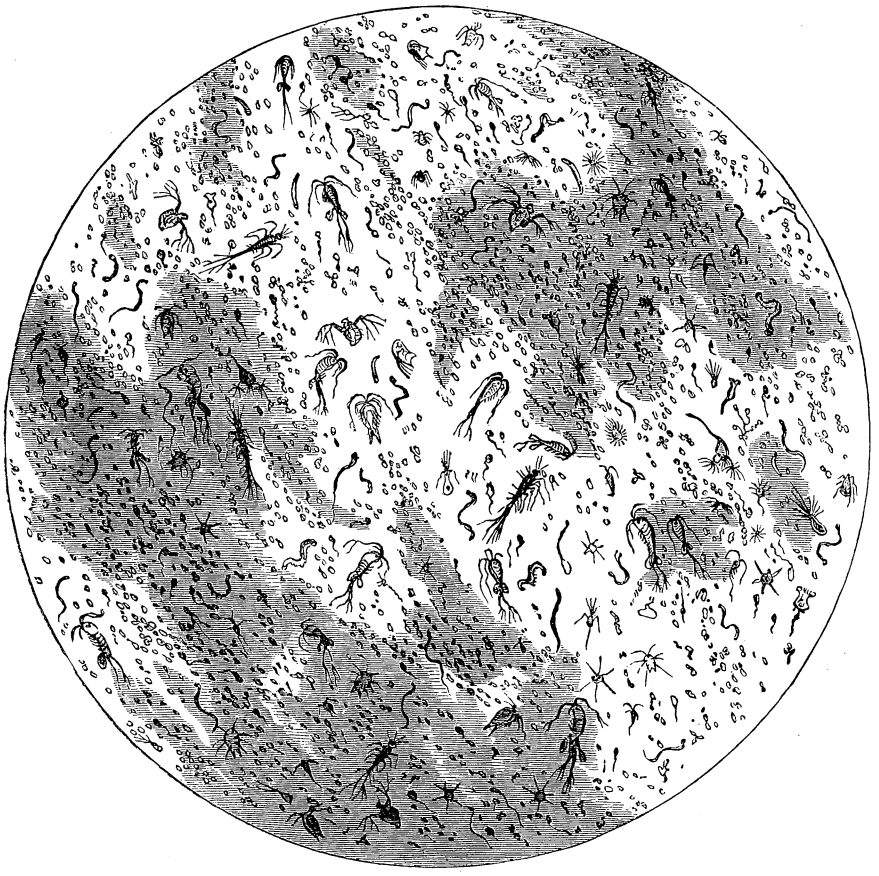
* An excellent Aquarium may be seen in the rooms of the Academy of Arts and Sciences at Philadelphia; we may also recommend to the attention of our readers, what are called in the flourishing advertisements, the "River Gardens," at Barnum's Museum. Even these are exceedingly amusing and instructive. There is a still more extensive establishment of this kind in Boston, called the *Aquarial Gardens*, where there are some twenty reservoirs, handsomely fitted up and well arranged, in which there is an extensive collection of marine as well as fresh water animals.

Among American works on aquaria, we may mention "Life beneath the Waters," by A. M. Edwards, published by Baillière & Co., 290 Broadway, 1858, which furnishes all requisite information on the subject. We particularly recommend the work, as furnishing some information on American marine and fresh water animals not easily obtained elsewhere.

† In England, the *Larvarium* has recently been popularized; in respect to this, Mr. Tuthill writes as follows, in an excellent article on the importance of Natural History as a popular study—*New York Daily Times, May*, 1859.

"The next need in this direction is that some one will do for the tribes of insects what Gosse and Kingsland did for the subaqueous small fry. We want a cheap 'Larvarium,' in which to hatch moths and butterflies out of the tufts of cobwebs in the corners that housewives abhor, in which to grow the tiny eggs that adhere to the leaves of plants and underlie the turf, into spiders, worms, and flies, and so unveil the mystery of the lives of these total strangers that still are in and out of our doors daily. The inclosed rear-yard of every city lot conceals a grand menagerie of rare animals, just as rare and as little known as if they only bred in Africa, whose metamorphoses are well worth watching. . . . . One slug known from the egg to the end, one moth personally observed from the hatching of the larva to the death of the imago, makes a memorable chapter in one's education. The moral effects of such studies are on all hands recognized and welcomed. They are no less wholesome physically—drawing irresistibly old and young into the open air, to the fields, the woods, and the beach. When they become fashionable, gymnasiums will fall into decay, and we shall hear less lay preaching about the necessity of exercise for sedentary folks."—This is the spirit of the true naturalist, and cannot be too widely diffused.

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CONTENTS OF A DROP OF WATER, AS SEEN BY THE MICROSCOPE.*

DIVISION V. PROTOZOA.

THIS last Division of the Animal Kingdom includes a number of creatures of a very low type of organization, which appear almost to occupy a sort of neutral ground between animals and vegetables. Their bodies consist either of a simple elementary cell, with its contents, or of an aggregation of several of these cells; each, however, still appearing to retain its independent existence. They are generally of very minute size, and only to be observed with the microscope. It is in vain to seek in these creatures for any internal organs. Nearly all live in water; a few only inhabit the intestines of other animals. They generally present the appearance of a transparent gelatinous cell, the substance of which they are composed being called *sarcode*. Some of them are propagated by a division of the substance of which their bodies are formed; others by a kind of gemmation, and others in still different ways. They all live by imbibing fluids through their outer surface, or by the amalgamation of solid substances with the gelatinous mass of which they consist.

Referring the reader to our brief description of the physiology of the Protozoa, Vol. I., p. 17, and to our classification, p. 30, we proceed to notice them under the three classes of *Infusoria*, *Porifera*, and *Rhizopoda*.

* "All the forms represented in the engraving are found in nature; most of them are common in the water of the Thames, at London, and many of them in our Croton water. They are generally very active, some of them shooting about like arrows, and others writhing, tossing, and tumbling like harlequins. Many of these creatures bear the most hideous forms, and others possess the fiercest and most predaceous appetites. Nevertheless, we swallow thousands of them daily, not with impunity merely, but with the highest relish. Not only species of the *Infusoria*, which we are about to notice, but species of *Rotifera* and *Rhizopoda* abound in common water.

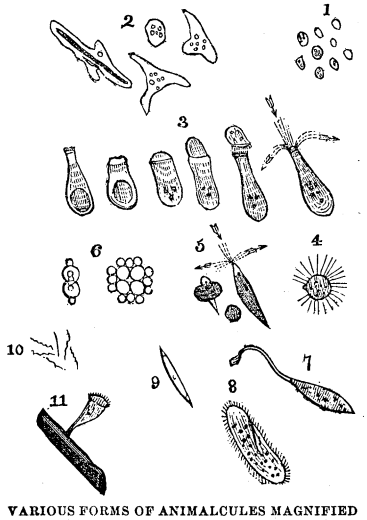
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Class I. INFUSORIA.

This Class of Animals is one of the revelations of the microscope which is calculated to fill the mind with profound astonishment at the fullness and infinitude of animal life. Though generally so minute as to elude the unaided vision, they are still of various forms and sizes, and are arranged by naturalists under various subdivisions. Nearly every drop of water on the surface of the globe appears to contain them in greater or less profusion;* some of them are not more than one two-thousandth of an inch in length, and even the generality of the race do not exceed one-fiftieth of an inch. Eight hundred thousand millions may be contained in a cubic inch of water, and a thousand millions in a single drop of water! Nevertheless, these creatures live, and have their being, and are marked with habits and capacities well worthy our consideration. They also seem to perform an immense work in the economy of nature. The progeny of some species amount to two hundred and sixty millions in a single month, thus supplying an incredible amount of food to the multitudinous generations of minute animals that inhabit the waters of the earth. We shall, however, be able to notice only a few of the more remarkable species, included in the orders which compose this class—*Stomatoda* and *Astomata*.

ORDER 1. STOMATODA.

This term is derived from the Greek, *stoma*, a mouth. The order includes several families, all of which are distinguished by the possession of a mouth.



VARIOUS FORMS OF ANIMALCULES MAGNIFIED

Fig. 1, *Monads;* 2, Forms assumed by the *Amœba;* 3, Flask Animalcules, *Enchelis;* 4, *Actinophrys sol;* 5, *Euglena viridis;* 6, *Gonium pectorale;* 7, *Trachelias anas;* 8, *Paramecium aurelia;* 9, *Navicula;* 10, *Vibrio Spirillum;* 11, *Vorticella Stentor.*

THE MONADIDÆ.

These consist of rounded or oval animalcules, each of which possesses a mouth, furnished with cilia, through which it is able to introduce into its substance, particles of solid matter which serve for its nutrition. One species is called the TWILIGHT MONAD, *Monas crepusculum*, from its being considered as forming the unit of existence, the point from whence the glimmering spark of life first emerges out of the darkness of nonentity. It consists, says Gosse, "of a tiny speck of pellucid matter, rounded in form, and supposed from its movements and from analogy, to be furnished with a single cilium, by the lashing action of which it rows itself through the water. No words can convey an adequate idea of the size of an animal so minute as this; but the imagination may be assisted by supposing a number of them to be arranged side by side in contact with each other, like the beads of a necklace, when twelve thousand of them would go comfortably within the length of a single inch. If we take a bunch of leaves of the common sage, for example, or a few twigs of hay, and, tying them into a bundle, suspend them in a jar of water, allowing the contents to remain untouched, but exposed to the air, some interesting results will follow. If we examine it on the second day, we shall find a sort of scum covering the surface and the

* "It is a great error, which the common style of exaggeration in writing on such subjects has brought about, and which great numbers of people believe, that all water contains animalcules, and that every drop of water is filled with animal life. So far is this from the truth that, in ordinary clear water taken from the middle of a well or from the center of a spring, there is but little chance of finding animal life; and any creature discovered by the microscope in such water must be regarded as an estray from the mossy sides of the spring, or the chinks of the stones, and of the bucket in the well. But it is equally true that in the moss at the sides of the clearest spring, myriads of animalcules live, and a drop of water scraped with the green ooze from the old oaken bucket, overflows with animal

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whole fluid becoming turbid, and slightly tinged with green. If now we take, with the point of a quill or a pin, a minute drop of the liquid, and examine it with a good microscope under a magnifying power of two hundred diameters, we discover the water to be swarming with animal life. Immense multitudes of minute round or oval atoms are present, which move rapidly with a gliding action. These are animals of the genus *Monas*. Among them we shall probably see other bodies more minute, resembling short lines, most of which are seen to be composed of more or fewer bead-like bodies, united into a chain. These occasionally bend themselves, wriggle nimbly, and effect a rather rapid progression in this manner. The scum, or transparent pellicle, is found to be composed of countless millions of these latter, congregated about as thickly as they can lie into patches. They constitute the genus *Vibrio;* several may be seen among them briskly wriggling about, which resemble a little coil of spiral wire. Such forms bear the generic appellation of *Spirillum*." (See engraving, p. 646.)

THE VORTICELLIDÆ.

These animals, called *Bell-Animalcules*, on account of the shape of some of the species, present phenomena as remarkable as any in the history of animated nature. They are characterized by the possession of a fringe of rather long cilia, surrounding the anterior extremity, which can be exserted and drawn in at the pleasure of the creature; by the vibration of these cilia the little animal, which usually has somewhat the appearance of a miniature wine-glass, supported upon a very long stalk, can produce a sort of vortex in the water, by which smaller animals and minute floating particles of alimentary matter are drawn into the mouth. (See engraving, p. 646.) Some of these little creatures are furnished with a horny case for the protection of their delicate bodies, whilst others are quite naked.

The genus *Vorticella*, from which the name given to the family is derived, consists of animals of the latter description. Each of these little creatures is placed at the top of a long flexible stalk, the other extremity of which is attached to some object, such as the stem or leaves of an aquatic plant. This stem, slender as it is, is nevertheless a hollow tube, through the entire length of which runs a muscular thread of a still more minute diameter. When in activity, and secure from danger, the little vorticella stretches its stalk to the utmost, whilst its fringe of cilia is constantly drawing to its mouth any luckless animalcule that may come within the influence of the vortex it creates; but at the least alarm the cilia vanish, and the stalk, with the rapidity of lightning, draws itself into a little spiral coil. But the vorticella is not wholly condemned to pass a sort of vegetable existence, rooted, as it were, to a single spot by its slender stalk; its Creator has foreseen the probable arrival of a period in its existence when the power of locomotion would become necessary, and this necessity is provided for in a manner calculated to excite our highest admiration. At the lower extremity of the body of the animal, at the top of its junction with the stalk, a new fringe of cilia is developed; and when this is fully formed, the vorticella quits its stalk, and casts itself freely upon its world of waters. The development of this locomotive fringe of cilia, and the subsequent acquisition of the power of swimming by the vorticella, is generally connected with the propagation of the species, which, in this and some of the allied genera, presents a series of most curious and complicated phenomena.

ORDER 2. **ASTOMATA.**

This includes the *Mouthless Infusoria*, which appear to be nourished entirely by the absorption of fluid matters through their outer surface.

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organizations in the highest state of activity; and after a variety of practice in waters of all kinds, we are able to say, that we have not yet found a half-pint of fresh water in any part of the country in which there were not more or less animalcules; and in most water, after standing a few days, they were countless. But of course the most crowded residences of the animalcule world are in standing water and exposed streams, on which the sun shines. And although Croton water is more free from them than a cistern of rain-water, yet it contains more than ordinary well-water by a thousand-fold. There is scarcely any form of animalcule known to inhabit fresh water which we have not found in the Croton, with the aid of the microscope."—*Harpers' Magazine, March*, 1859.

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THE ASTASIDÆ.

These are distinguished by an extremely contractile body, generally of a green or red color. The *Euglena viridis* (see page 646) is very contractile and assumes various forms; it often appears in the water in such myriads as to make it appear of a green color.

THE PERIDINIDÆ.

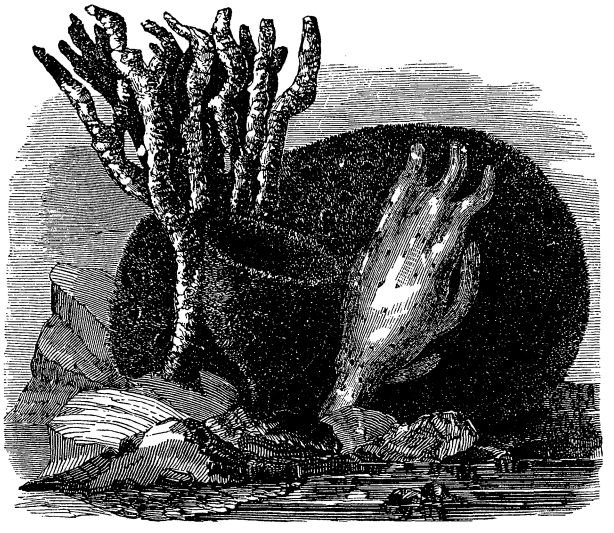
In this family the species are provided with a silicious case or carapace, furnished with an opening which has a circlet of cilia: the shell is often produced into curious horn-like processes. Motion in these animals is not only effected by the cilia, but also by the aid of filiform appendages protruded from the carapace.

THE OPALINIDÆ.

These animals are colorless, of a glassy transparency, moving by cilia arranged in oblique lines, upon their flat, oval bodies; they have only been found as parasites in the intestines of frogs and certain worms.

Class II. PORIFERA.

This term is from the Latin *porus*, pore, and *fero*, to bear, and the animals to which it refers are popularly called *Sponges*. These are generally regarded, and perhaps justly, as standing on a sort of debatable ground between the animal and vegetable kingdoms, or at all events as occupying a frontier station in the former and approaching more closely to plants than any other animated beings. Sponge, in the state in which we usually see it, consists of a congeries of horny filaments, interlaced in every direction so as to form an intricate net-work of intercommunicating cells. Imbedded in these threads, in the majority of sponges, are a number of very minute needle-pointed siliceous or calcareous particles of various forms; these are called *spicula*. In most cases, the spicula are simply of an acicular form, slender and cylindrical, and pointed at both ends. In other instances they have a small knob at one end, while the opposite extremity is pointed, giving them exactly the appearance of minute pins; in others, again, we find one end transformed into a fork with two or even three prongs; or the whole spiculum consists of three or four spines of equal length. This framework, with its contained spicula, is, however, only a sort of skeleton, on which the true living portion of the sponge is supported. This consists of a coating of gelatinous matter, which is spread over all the fibers of the reticulated skeleton; its consistence is very like the white of an egg, and it runs freely away from the sponge when the latter is taken out of the water. But when examined under the microscope, this gelatinous coating is found to consist entirely of an immense number of aggregated sarcode-cells, exactly resembling the *Amœba*, the simplest type of the *Rhizopoda*, which we shall hereafter describe. Like that curious creature, each of these cells appears to possess a perfectly independent existence; each presents one or more contractile spaces; and even



SPONGES OF VARIOUS FORMS

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